

7-247

# TM 9-247

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

*Reinstated Cir 310-47, 97mar73*

**MATERIALS USED FOR CLEANING  
PRESERVING, ABRADING, AND  
CEMENTING ORDNANCE MATERIEL  
AND RELATED MATERIALS  
INCLUDING CHEMICALS**



**HEADQUARTERS, DEPARTMENT OF THE ARMY**  
**OCTOBER 1960**

TECHNICAL MANUAL }  
 No. 9-247

HEADQUARTERS,  
 DEPARTMENT OF THE ARMY,  
 WASHINGTON 25, D. C., 25 October 1960

# MATERIALS USED FOR CLEANING, PRESERVING, ABRADING, AND CEMENTING ORDNANCE MATERIEL; AND RELATED MATERIALS INCLUDING CHEMICALS

	Paragraphs	Pages
CHAPTER 1. INTRODUCTION .....	1, 2	2
2. CLEANING MATERIALS		
Section I. General .....	3-5	3
II. Characteristics, supply data, and use of cleaning materials .....	6-81	4-20
CHAPTER 3. PRESERVATIVE MATERIALS		
Section I. General .....	82-84	21
II. Characteristics, supply data, and use of preservative materials .....	85-112	21-25
CHAPTER 4. ABRASIVE MATERIALS		
Section I. General .....	113-115	27
II. Characteristics, supply data, and use of abrasive cloths and papers; and polishing and grinding compounds .....	116-139	29-33
III. Characteristics, supply data, and use of abrasive bands, belts, and disks .....	140-146	34, 35
CHAPTER 5. ADHESIVE MATERIALS		
Section I. General .....	147-149	36
II. Characteristics, supply data, and use of adhesive materials .....	150-169	36-39
CHAPTER 6. SEALING MATERIALS		
Section I. General .....	170-171	40
II. Characteristics, supply data, and use of sealing materials .....	172-183	40-42
CHAPTER 7. CHEMICALS AND OTHER MISCELLANEOUS MATERIALS		
Section I. General .....	184-186	43
II. Characteristics, supply data, and use of chemicals .....	187-211	43-46
III. Characteristics, supply data, and use of miscellaneous materials .....	212-238	46-50
APPENDIX. REFERENCES .....		51
INDEX .....		53

\*This manual supersedes TM 9-1007, 13 November 1956.

# CHAPTER 1

## INTRODUCTION

---

### 1. Scope

*a.* This manual is intended for the use of personnel whose duties require a general knowledge of the materials employed in cleaning, preserving, abrading, cementing, and sealing of Ordnance materiel. It contains information outlined in (1) through (3) below.

- (1) Pertinent materials listed in type 1, SM 9-1 series, Department of the Army supply manuals.
- (2) Pertinent materials that are obtained from other technical services.
- (3) Technical service supply manual and Federal supply classification code for each item listed.

*b.* This manual differs from TM 9-1007, 13 November 1956, as indicated in (1) and (2) below.

- (1) Adds information on new materials.
- (2) Deletes information on:
  - (a) Obsolete materials.
  - (b) Paints, lacquers, petroleum products, and packaging materials.

*c.* The appendix contains a list of current references, including supply and technical manuals, forms, and other available publications applicable to the materials used for cleaning, preserving, abrading, and cementing Ordnance materiel and related materials including chemicals.

*d.* Any errors or omissions will be forwarded on DA Form 2028 direct to the Commanding Officer, Raritan Arsenal, ATTN: ORDJR-OPRA, Metuchen, N. J.

### 2. Forms, Records, and Reports

*a. General.* Responsibility for the proper execution of forms, records, and reports rests upon the officers of all units maintaining this equipment. However, the value of accurate records must be fully appreciated by all persons responsible for their compilation, maintenance, and use. Records, reports, and authorized forms are normally utilized to indicate the type, quantity, and condition of materiel to be inspected, to be repaired, or to be used in repair. Properly executed forms convey authorization and serve as records for repair or replacement of materiel in the hands of troops and for delivery of materiel requiring further repair to ordnance shops. The forms, records, and reports establish the work required, the progress of the work within the shops, and the status of the materiel upon completion of its repair.

*b. Authorized Forms.* The forms generally applicable to units maintaining this materiel are listed in the appendix. For a listing of all forms, refer to DA Pam 310-2. For instructions on use of these forms, refer to FM 9-3 and FM 9-4.

*c. Field Reports of Accidents.* The reports necessary to comply with the requirements of the Army safety program are prescribed in detail in AR 385-40. These reports are required whenever accidents involving injury to personnel or damage to materiel occur.

*d. Report of Unsatisfactory Equipment or Materials.* Any deficiencies detected in the equipment covered herein, which occur under the circumstances indicated in AR 700-38, should be immediately reported in accordance with the applicable instructions in cited regulation.

## CHAPTER 2

### CLEANING MATERIALS

---

#### Section I. GENERAL

##### 3. Scope

This chapter contains information on soaps and other types of detergents, solvents, acids, and chemicals used to clean or remove corrosion, dirt, grease, rust, and other foreign matter from metallic or nonmetallic surfaces.

##### 4. Cleaning Procedures

The items in the following paragraphs are used in the cleaning procedures which are described in detail in TM 9-208-1. The makeup

instruction, where applicable, are also given in detail in TM 9-208-1 unless indicated otherwise.

##### 5. Precautions

The precautionary notes that are found in some of the following paragraphs indicate the extent of first aid which should be given in most instances. They also indicate hazards to personnel using these materials. Protective clothing must be worn when handling acids, acid solutions, or highly caustic materials.

#### Section II. CHARACTERISTICS, SUPPLY DATA, AND USE OF PRESERVATIVE MATERIALS

##### 6. Acetic Acid, Glacial, Technical (O-A-76a)

*a. Characteristics.* This is a colorless liquid with a pungent odor. It is miscible with water. It solidifies at approximately 62° F. and expands when it solidifies.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-5-6800.

*c. Use.* It is used as a component of an acetic-nitrate solution to remove mill scale and other surface contaminations from magnesium-alloy sheets, other wrought forms, and solution-heat-treated castings.

**Warning:** This is a corrosive liquid. Do not get liquid or vapors in eyes, on skin, or on clothing. In case of contact, flush affected area immediately with plenty of water for at least 20 minutes. Get medical attention. Acetic acid freezes at 62° F., forming hard lumps which may break carboy when moved. If frozen, thaw by carefully moving carboy to warm area. Store in area maintained above 62° F.

##### 7. Acetone, Technical (O-A-51)

*a. Characteristics.* This is a clear, colorless,

highly volatile and flammable liquid with a mintlike odor.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Uses.*

- (1) It is used to remove gummy residues from engine parts, such as valves, valve stems, and carburetor parts.
- (2) It is used as an emergency cleaner for paint-spray equipment and brushes.
- (3) It is used to assist in the removal of old rubber from solid-tire wheels.
- (4) It may be used when methyl ethyl ketone is not available for cleaning equipment used to apply strippable plastic coating compound.
- (5) It is used with dry ice in a low-temperature bath to separate optical elements cemented with a thermosetting adhesive, such as optical, liquid, synthetic-resin adhesive. Refer to TM 9-1501.

- (6) It is sprayed on optical mirrors to remove dust and moisture after the mirrors have been cleaned in rain water. Refer to TM 9-1501.
- (7) It is used to clean traces of magnesium fluoride from optical coating equipment. Refer to TM 9-1501.

**Warning:** Acetone is poisonous and very flammable. Keep away from heat, sparks, and open flame. Keep container tightly closed. Use with adequate ventilation and wear an approved respirator in inclosed areas. Avoid repeated or prolonged contact with skin.

## 8. Alcohol, Denatured (O-A-396)

*a. Characteristics.* This is a clear, colorless, volatile, flammable liquid composed chiefly of ethyl alcohol, but containing other substances that make it unfit to drink.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

### *c. Uses.*

- (1) It is used for removing alcohol-soluble finishes, such as shellac, varnish, and for cleaning brushes used with such varnishes.
- (2) It is used for cleaning hydraulic systems that use nonpetroleum-base hydraulic fluid such as that used in automotive brake systems.

**Caution:** It is not for use as a cleaner for hydraulic systems using petroleum-base hydraulic fluid.

**Warning:** This alcohol is highly flammable and poisonous. Drinking of this alcohol can cause blindness and death. Inhaling its fumes should be avoided. Keep away from open flame.

## 9. Ammonium Hydroxide, Technical (O-A-451)

*a. Characteristics.* This is a colorless, transparent, aqueous solution having a pungent odor and caustic and alkaline taste. It is also known as aqua ammonium. It contains a minimum of 27 percent by weight of ammonia gas.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

### *c. Uses.*

- (1) It is used as an additive to soapy water for the cleaning of glass.
- (2) It is used as a component of a galvanic anodizing solution that is used in type IV treatment of magnesium. Refer to MIL-M-3171A.

**Warning:** Use care in opening this container as a portion of the contents may blow out violently because of the pressure of the ammonia gas. Place a cloth over the cap or stopper before removal. Avoid inhalation. The fumes are very irritating to the throat and lungs and may cause vomiting. The liquid will burn the skin. In case of contact with skin or eyes, flush affected area immediately with water for at least 20 minutes. Get medical attention.

## 10. Antistatic and Cleaner Compound: Liquid (MIL-C-12156A)

*a. Characteristics.* This is a volatile petroleum distillate with a narrow distillation range. It is free of suspended matter and unsaturated hydrocarbons.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used to prevent the formation of an electrostatic charge on sheet methacrylate plastic such as is used on plotting boards. The surface of the plastic is covered with a thin film of the cleaner and prevents the electrostatic attraction of dust.

## 11. Benzene, Technical: Liquid (VV-B-231)

*a. Characteristics.* This is a clear, colorless, highly volatile liquid, having an odor similar to gasoline. It is the commercially available hydrocarbon benzene ( $C_6H_6$ ), which is an organic solvent. It solidifies at 42° F., without damage to container or contents.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 6810. It is listed in SM 10-1-6800.

*c. Use.* It is used to remove gum formations from fuel tanks and metal surfaces.

**Warning:** Benzene is highly flammable, and the vapors form explosive mixtures with air. It is also toxic. If absorbed by the body,

it will cause nausea, headache, extreme fatigue, and anemia. It should be used in the open air or in a well-ventilated room and not near an open flame.

## 12. Boric Acid, ACS: Crystals

*a. Characteristics.* This acid consists of colorless crystals that appear white when finely divided or powdered. This acid is soluble in water or alcohol.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-5-6800.

*c. Use.* It is used with sulfuric acid to make a solution for decoating optical elements composed of barium-crown and dense barium-crown glass. It should not be used on rare element glass.

## 13. Calcium Carbonate, Precipitated, USP

*a. Characteristics.* This is a finely powdered chalk that is free from impurities. It is softer than glass and will not scratch when applied to optical lenses.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6505. It is the responsibility of Raritan Arsenal.

*c. Use.* It is used for polishing and cleaning optical lenses and prisms prior to coating. This chalk will remove any substance that remains after the item is cleaned with a detergent.

## 14. Carbon Removing Compound: Dip Type (P-C-111)

*a. Characteristics.* This is a single-phase type, ready-to-use, liquid, carbon-removing compound. It will not damage metal surfaces including aluminum, brass, lead, magnesium, and zinc when used in accordance with manufacturer's instructions.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used in a soak tank for softening and facilitating removal of carbon, oil, gum, paint, and other contaminants (except rust and corrosion) from items such as pistons, carburetors, fuel pumps, and engine assemblies.

**Warning:** This is a corrosive liquid. If splashed on skin, wash off thoroughly with water for at least 20 minutes. Get medical attention.

## 15. Carbon Tetrachloride, Technical (O-C-141)

*a. Characteristics.* This is a colorless, volatile, nonflammable, poisonous solvent with an odor similar to chloroform. It is a highly effective solvent for oils and greases and mixes in all proportions with cleaning solvents, acetone, alcohol, etc. It is a nonconductor of electricity.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*Note.* Cleaning compound (par. 19) or trichloroethane (par. 77) should be used for cleaning purposes whenever possible in lieu of carbon tetrachloride.

*c. Use.* Its use should be limited to cleaning electrical mechanisms, components, and wiring which must not be cleaned with other solvents because of fire hazards or their effect on rubber, fiber, etc.

**Caution:** Carbon tetrachloride will dissolve some plastics used for electrical insulation.

**Warning:** The vapor and liquid of carbon tetrachloride are poisonous and must not be taken into the body by inhalation or otherwise. Provide adequate ventilation during use and drying period. Do not heat this solvent or permit it to come in contact with heated surfaces, because phosgene, a heavy and very poisonous gas, is formed. When this solvent is used as a fire-extinguishing agent, take precautions to avoid the poisonous gas. The vapor is heavier than air and tends to creep along the floor, thence to lower floors.

## 16. Chamois Leather, Sheepskin (KK-C-300)

*a. Characteristics.* Chamois, trimmed Class 1 or untrimmed Class 2, is a type of leather produced from sheepskin which is so treated that it is pliant, soft, and absorbent.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 8330. It is listed in SM 10-1-8325, 30, 35.

*c. Use.* It is used to wipe and dry glass and painted surfaces of equipment after washing.

## 17. Chromium Trioxide, Technical: Flake (O-C-303, Type II)

*a. Characteristics.* These are reddish-brown flakes that absorb water rapidly when exposed to moist air.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Uses.*

- (1) It is used as a component of a cleaning solution to clean magnesium-alloy items to prepare them for arc or gas welding. The solution is composed of chromium trioxide, sodium nitrate, calcium or magnesium fluoride, and water.
- (2) It is used as a component of a cleaning solution to remove the oxide from magnesium alloys and lower the surface resistance of the metal before spot welding. The solution is composed of technical chromium trioxide, concentrated technical sulfuric acid, and water.
- (3) It is used as a component of a cleaning solution to remove light corrosion from sheet magnesium, such as panels of NIKE trailer vans. This method does not reduce the thickness of the material. This solution is composed of technical chromium trioxide and water (10 percent chromium trioxide).
- (4) It is used as a component of a solution to remove corrosion products and surface oxidation from magnesium-alloy parts by immersion. This solution is composed of technical chromium trioxide and water (16 percent of chromium trioxide).
- (5) It is used as a component of a chromic-nitrate solution to remove graphite-base lubricants. It can be substituted for the solution in (4) above to remove corrosion from magnesium parts. This solution is composed of technical chromium trioxide, sodium nitrate, and water.
- (6) It is used as a component of a chromic-nitric-hydrofluoric acid solution to clean magnesium alloy castings, particularly die castings.
- (7) It is used with phosphoric acid and water in solution as a dip application in conjunction with black oxide finishing and phosphatizing processes, to increase the rust-proofing quality of the finish.
- (8) It is used as a component of a chromium trioxide, nitric acid, and sulfuric

acid solution for the dichromatizing of zinc-base parts, such as carburetors and fuel pumps.

- (9) It is used to replenish a galvanic anodizing solution (sulfate-dichromate-hydroxide bath) used for Type IV treatment of magnesium alloys. Refer to MIL-M-3171A.

**Caution:** The acid solution will remove cadmium or zinc plating. Therefore, all cadmium- or zinc-plated screws or other parts must be thoroughly masked before applying the solution. The acid solution will remove cadmium or zinc plating and will attack copper-base alloys. Therefore, it must not be used on cadmium- or zinc-plated parts or on copper-base alloy inserts unless thoroughly masked off. The acid solution has a detrimental effect on copper and brass. Any copper or brass inserts or bushings must be removed prior to treatment.

## 18. Cleaning Compound: Alkali-Type (P-C-436a)

*a. Characteristics.* This is a granular product that will remain uniform in composition and will not segregate or cake during handling or storage. It contains no volatile substances, such as chlorinated hydrocarbons, phenolic compounds, benzol, or the like.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used as a hot soak cleaner to remove mineral oil, grease, and road dirt from ferrous or nonferrous metal parts.

## 19. Cleaning Compound: Liquid Form

*a. Characteristics.* This is a somewhat flammable liquid. It is a mixture of dry-cleaning solvent (stoddard), methylene chloride, and chloroethylene. It does not dry as rapidly as other solvents.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7930. It is listed in SM 10-1-7900, 8000.

*c. Use.* It is used to clean electrical and electronic materiel.

**Caution:** This compound may leave a slight oily residue, interfering with operation

of contact points. Contact points should, therefore, be cleaned with nonconductive abrasives and thoroughly dusted.

**Warning:** This is a poisonous, flammable compound. Use only in well-ventilated areas. Avoid repeated or prolonged contact with skin. Keep away from heat and open flame.

## 20. Cleaning Compound, Engine Cooling System: w/Inhibitor (MIL-C-10597B)

*a. Characteristics.* This cleaning compound consists of two components, aluminum chloride and oxalic acid, which are packaged in the larger container of the two-compartment container. The aluminum chloride is contained in the bottle which is surrounded by the powdered oxalic acid. An inhibitor (borax) is furnished in the second compartment.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used only for cleaning clogged or rusted cooling systems of motor vehicles. The cleaning procedure for this compound is described in TM 9-2858.

**Caution:** After cleaning with this compound, metal surfaces are subject to increased rusting. Hence the compound should not be used as a routine maintenance procedure each time antifreeze is added to the cooling system in the fall or drained in the spring.

**Warning:** Oxalic acid is poisonous and causes skin irritation. If splashed on skin or in eyes, flush immediately with water for at least 20 minutes. Get medical attention.

## 21. Cleaning Compound, High Pressure Cleaner: Powder, Steam-Cleaning Type (P-S-751)

*a. Characteristics.* This compound is a non-hygroscopic, granular mixture in powder form which will remain uniform in composition and show no evidence of segregation or caking during handling or storage. It will not clog nor impede the flow of solution by precipitation and building up of solids in the jets, coils, or orifices of the steam-cleaning machines. It does not have any adverse effects on the user (skin burn or sneezing).

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used in high-pressure steam-cleaning machines for cleaning ferrous and non-ferrous surfaces of equipment, such as motor vehicle chassis and engines. It may also be used to clean painted or chemically coated metal surfaces, floors, and walls.

**Caution:** When the machine is shut down at the end of a shift, a "blowdown" is required for retarding scale formation in the coils of the machine.

## 22. Cleaning Compound, Lapping Disk: Liquid

*a. Characteristics.* This is a solution made of aliphatic and aromatic petroleum hydrocarbons. It has a minimum flash point of 270° F.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used on lapping disks when tool bits are being lapped and sharpened. Several drops of the compound are applied to the lapping disk before the tool is sharpened.

## 23. Cleaning Compound, Optical Lens: Liquid

*a. Characteristics.* This is a soap in liquid form.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7930. It is listed in SM 10-1-7900, 8000.

*c. Use.* It is used for cleaning lenses, optical instruments, reflectors, etc.

## 24. Cleaning Compound, Solvent (Cleaner, Bore, Small Arms and Automatic Aircraft Weapons) (RA(ID)PD126)

*a. Characteristics.* This is a clear, transparent, homogeneous compound. It is free from obnoxious odors. It is not injurious to personnel using it, provided reasonable safety precautions are followed. It has a minimum flash point of 120° F. The compound dissolves corrosive primer salts deposited in the bore.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used for cleaning bores of small arms and automatic aircraft weapons. The material provides a temporary rust-resistant coating for the cleaned surfaces.



**25. Cleaning Compound, Solvent:  
Degreasing, Self-Emulsifying  
(Mil-S-11090A)**

*a. Characteristics.* This compound is a liquid solvent containing an emulsifying agent or agents. It is ready for use as received. It will not remove wax-type rust preventive compounds.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used to remove oils, greases, asphalts, tars, and preservative-type compounds, except wax-type, from metallic and painted surfaces. The solvent is used full strength and is applied by brush, swab, soak, or spray followed by rinsing with a jet of steam or water. If water must be avoided, rinse with dry-cleaning solvent (P-S-661).

**26. Cloth, Cotton, Batiste: White**

*a. Characteristics.* This is a fine-grade, soft, lintless cotton cloth.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 8305. It is listed in SM 10-1-C2-2A.

*c. Use.* It is used for wiping cloths in shops using optical coating equipment where the slightest trace of lint may cause malfunctioning.

**27. Cloth, Jute, Burlap (CCC-B-811)**

*a. Characteristics.* This is a coarse thread, plain weave jute cloth.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 8305. It is listed in SM 10-1-C2-2A.

*c. Use.* It is used for cleaning and drying bores of weapons when scrubbed with solvent cleaning compound (par. 24).

**28. Corrosion Removing Compound: Alkaline,  
Immersion (ORDJR-OME-PD-110A)**

*a. Characteristics.* This compound is a dry powder or fine granular material or either in combination with flake material. This compound is free from alkali metal cyanide.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Uses.*

- (1) It is used to remove rust and scale from iron and steel components, such

as engine blocks, cylinder heads, and miscellaneous engine parts.

- (2) It can also be used to remove paint, heavy grease, oil, and phosphate coatings. This should be accomplished in a separate tank.

**Warning:** Due to large quantity of caustic soda (lye), do not add large amounts of the compound to the water at one time, since the reaction may generate enough heat to cause an eruption. Protective clothing and glasses should be worn when using or making this solution. In case of contact with skin or eyes, flush immediately and thoroughly with water for at least 20 minutes. Get medical attention.

**29. Corrosion Removing Compound:  
Hydrochloric Acid w/Inhibitor  
(Pickling Acid) (MIL-A-13528(ORD))**

*a. Characteristics.* This is an acid-pickling compound composed of hydrochloric (muriatic) acid and an inhibiting material that limits the action of the acid on the base metal after the rust has been removed. The compound as issued is ready for use.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used to remove heavy rust deposits from ferrous-metal parts, such as bomb fins, engine blocks, and small arms materiel. This compound does not change the dimensions of the parts materially if properly applied.

**Warning:** Phosphine (hydrogen phosphide), a colorless, poisonous gas, forms very readily when any mineral acid reacts with metals or alloys containing phosphorus. Adequate ventilation must be provided since this gas is a dangerous fire, explosive, and toxic hazard. This acid causes burns. Avoid breathing vapors. In case of contact with skin or eyes, flush immediately and thoroughly with water for at least 20 minutes. Get medical attention.

**30. Corrosion Removing Compound:  
(Mtl-Conditioner and Rust-Remover)  
Phosphoric-Acid Type (ORDJR-OME-  
PD 109)**

*a. Characteristics.* This compound is a clear, homogenous, uninhibited phosphoric acid solu-

tion containing a wetting agent. This compound does not contain a grease solvent because it is a deruster for parts that have been precleaned.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used to remove rust from precleaned metal parts.

**Warning:** This compound contains a strong acid. Care must be taken to prevent contact between the compound and the operator's skin or eyes. Protective clothing and glasses should be worn when making up or using the solution. In case of contact, flush skin and affected areas immediately and thoroughly with water for at least 20 minutes. Get medical attention.

### **31. Corrosion Removing Compound: (Metal-Conditioner and Rust-Remover), Washoff Type (MIL-M-10578A Type I)**

*a. Characteristics.* This is a concentrated, homogenous, stable liquid, containing free orthophosphoric acid and water-soluble, nontoxic, organic, grease solvents.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used to remove rust and grease from ferrous-metal surfaces and provides a slight etching action for ferrous and nonferrous metals to promote the adhesion of paint or corrosive preventives.

**Caution:** Do not use this compound on electrical wiring, coil-steel springs, or other spring steels.

**Warning:** When diluting the compound, pour the compound into the water. Do not pour water into the compound. Phosphine (hydrogen phosphide), a colorless, poisonous gas, forms very readily when any mineral acid reacts with metals or alloys containing phosphorus. Since this gas is a dangerous fire, explosive, and toxic hazard, adequate ventilation must be provided. The amount of phosphine released from the acid bath increases with increase in temperature and in concentration of acid. Compound contains a strong acid. Operators should wear protective clothing and glasses when making up or using this compound. If splashed on skin or eyes, flush immediately and thoroughly with water for at least 20 minutes. Get medical attention. Avoid prolonged breathing of vapors.

### **32. Corrosion Removing Compound: (Metal-Conditioner and Rust-Remover) Wipe-Off Type (MIL-M-10578A, Type II)**

*a. Characteristics.* This is a dilute solution of orthophosphoric acid and water-soluble, organic, nontoxic, grease solvents. The acid is in lesser proportion and the grease solvents in greater proportion than in the wash-off type (par. 31).

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used to remove light or medium grease and rust deposits from ferrous metals, or to condition ferrous, galvanized, brass, or aluminum surfaces for painting. This process is described in TM 9-208-1. The remaining film of gray-white iron phosphate conditions the surface for paint.

**Caution:** Do not apply this cleaner to electrical wiring, steel coil springs, or other spring steel. The treated surfaces must be painted or coated with corrosion-preventive compound as soon as possible.

**Warning:** Pour the compound into the water. Do not pour the water into the compound. Phosphine (hydrogen phosphide), a colorless, poisonous gas, forms very readily when any mineral acid reacts with metal or alloys containing phosphorus. Since this gas is a dangerous fire, explosive, and toxic hazard, adequate ventilation must be provided.

### **33. Detergent, Painted Surface: Powder (P-C-431a, Type I)**

*a. Characteristics.* This is a cleaning agent in powder form consisting essentially of synthetic detergents. It is soluble and effective in hard, soft, and salt water. It is free from objectionable odors, contains no abrasives or fatty-acid soaps, and is not irritating to the skin.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7930. It is listed in SM 10-1-7900, 8000.

*c. Use.* It is used to remove grease, oil, and occupational soil from painted surfaces and in general soil removal. It is applied with brush, cloth, or sponge.

### 34. Drycleaning, Solvent (Stoddard Solvent) (P-S-661b, Type I)

*a. Characteristics.* This is a colorless, flammable liquid distilled from petroleum. It is not toxic and evaporates quickly without leaving a corrosion-inducing film on metal surfaces. It is a substitute for mineral-spirits paint thinner (par. 73).

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Uses.*

- (1) It is used for removing oil and greases from metal surfaces by brushing, immersion, or wiping.
- (2) It is used to remove oil and grease from wood and upholstery.
- (3) It is used as a substitute for mineral-spirits paint thinner, for thinning paints and varnishes, and for cleaning brushes and equipment used in the application of such finishes.

**Warning:** Flammable. Keep away from heat and open flame.

### 35. Ethyl Alcohol, Technical (JAN-A-463, Grade I)

*a. Characteristics.* This is a colorless, volatile, and flammable liquid that is 95 percent ethyl alcohol and approximately 5 percent water. It is not denatured.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used to clean optical parts by field and depot maintenance shops.

**Warning:** Flammable. Keep away from heat and open flame.

### 36. Hydrochloric Acid, Technical (O-A-86)

*a. Characteristics.* This is a solution of hydrogen chloride gas in water. It may contain higher percentages of impurities than the reagent acid. The solution contains approximately 31 percent, by weight, of hydrochloric acid. This acid is also called muriatic acid.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Uses.*

- (1) It is mixed with water and used to remove plaster and mortar spots from masonry and brick work. It will also

remove crusty efflorescence from brick, concrete, and cement block masonry surfaces.

- (2) It is used to make an acid-pickling compound that may be used instead of hydrochloric acid-with-inhibitor corrosion-removing compound to remove rust and scale.
- (3) It is also used for etching steel, as when marking tools and equipment. Fumes will corrode ferrous-metal surfaces not precoated with paraffin.

**Warning:** This is a corrosive liquid. If acid comes in contact with the skin, flush the affected area immediately with clean water for at least 20 minutes. Get medical attention. Personnel must wear goggles, rubber gloves, and aprons when working with acids or acid solutions. The reaction of the acid with metals or alloys containing phosphorus may form phosphine (hydrogen phosphide). This is a colorless, poisonous gas that is a dangerous fire, explosive, and toxic hazard. It must be removed by adequate ventilation.

### 37. Hydrofluoric Acid, Technical (O-H-795)

*a. Characteristics.* This is a solution of hydrogen fluoride, a colorless gas, in water. The acid mixes readily with water. It attacks glass. It contains 60 percent, by weight, of hydrogen fluoride.

*b. Supply Data.* This is a Navy item in FSC 6810. It is listed in Navy Stock List of General Stores FSC Group 68.

*c. Use.* It is used as a component of a chromic-nitric-hydrofluoric acid pickle solution for cleaning and etching magnesium-alloy parts to treat them prior to painting.

**Caution:** It must be kept in gutta-percha, lead, wax, paraffin-paper, or polyethylene bottles.

**Warning:** This is a very corrosive and poisonous liquid. Care must be taken to avoid inhaling the fumes from the acid and to avoid spilling the acid on the skin or in the eyes. If acid comes in contact with skin or eyes, flush immediately with water for at least 20 minutes. Get medical attention. The burns may not be visible or painful immediately.

### 38. Magnesium Fluoride, Technical (JAN-M-621, Class b)

*a. Characteristics.* This is a white powder that is almost insoluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Uses.*

- (1) It is used for coating optical elements to increase transmitted light. Refer to TM 9-1501.
- (2) It is used as a component of a solution that is used to clean magnesium-alloy items after degreasing to prepare them for arc or gas welding.
- (3) It is used as a component of a dichromate treatment solution that is used in Type II treatment of magnesium-alloy parts to prepare them for painting.
- (4) It is used as a component of a bright pickle solution that is used to prepare magnesium-alloy parts for arc or gas welding.

### 39. Methanol, Technical (O-M-232)

*a. Characteristics.* This is a colorless, volatile liquid that contains approximately 95 percent methanol and 5 percent water. The liquid tends to absorb additional moisture from the air. Methanol is known as methyl alcohol or wood alcohol.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used to remove perspiration residues (finger prints) from metal surfaces by immersion.

**Warning:** Methanol is flammable. Methanol is effective for removing perspiration residues but is recommended for use only where absolutely no fire hazards exist and where conditions can be closely controlled. Methanol must not be used by service activities without specific approval from the specific bureau, service, or command. Methanol, or wood alcohol, is a dangerous poison. Positive precautions shall be taken to insure against its being swallowed by personnel under the usual fatal assumption that it is a satisfactory substitute for certain beverages.

### 40. Methyl Ethyl Ketone, Technical (TT-M-261)

*a. Characteristics.* This is a clear, colorless, organic solvent with an acetone-like odor.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6810. It is listed in SM 9-1-6800.

*c. Uses.*

- (1) It is used to remove old paint and primer coating from phosphate-coated (Dow treated) magnesium parts.
- (2) It is used to clean equipment that has been used to apply strippable plastic coating compound.
- (3) It is mixed with toluene and used as a solvent for cold solder and metal filler compound.

**Warning:** It is flammable. Keep away from heat and open flame.

### 41. Naphtha, Aliphatic (TT-N-95)

*a. Characteristics.* This is a flammable liquid, distilled from petroleum. The initial boiling point is 85° C. The specific gravity at 20°/20° C. is 0.708 to 0.768.

*b. Supply Data.* This is an Air Force item in FSC 6810. It is listed in Air Force Supply List—SL6800.

*c. Use.* It is used to clean grease and oil from acrylate and methacrylate resin plastics.

**Warning:** This is a flammable liquid. Keep away from heat and open flame.

### 42. Napkin, Table, Textile Celanese, Lintless

*a. Characteristics.* This is a closely woven, washable, lintless, synthetic-fiber cloth with hem. It is 17 x 18 inches.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7210. It is listed in SM 10-1-7200.

*c. Use.* It is used to remove lint from optical lenses and prisms.

### 43. Nitric Acid, ACS

*a. Characteristics.* This is a mixture of nitric acid and water. This mixture is referred to as concentrated nitric acid. It contains approximately 70 percent of acid and has a specific gravity of 1.42. It is a clear, colorless liquid. On exposure to light, it becomes yellow.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6810. It is listed in SM 9-1-6800.

*c. Uses.*

- (1) It is a component of a chromic-nitric-hydrofluoric acid solution used to clean magnesium-alloy castings, particularly die castings.
- (2) It is used in a 5 percent nitric acid solution used to remove oxide coatings and corrosion from small aluminum-alloy parts.
- (3) It is used in a 20 percent nitric acid solution to remove stains and traces of corrosion from corrosion-resisting steel.
- (4) It is used as a component of a nitric-sulfuric acid solution to remove effects of blast-cleaning operations.
- (5) It is used as a component of a chrome-pickle solution.
- (6) It is used as a reagent or additive in the control and analysis of zinc-base phosphating material. Refer to TM 9-208-1.
- (7) It is used in the preparation of dichromatizing solutions for the passivating of zinc-base, die-cast items such as carburetors and fuel pumps.

**Caution:** It must not be subjected to a storage temperature lower than 0° F.

**Warning:** This is a corrosive liquid. In case of contact with skin or eyes, flush immediately with water for at least 20 minutes. Get medical attention. Avoid inhaling fumes.

#### 44. Nitric Acid, Technical

*a. Characteristics.* This is a colorless to yellowish or light-brown, highly corrosive liquid with a pungent odor. On exposure to light, it becomes yellow, or yellowish brown. This change in color does not affect the properties of the acid. It has a specific gravity of 1.381 and is 61 percent nitric acid.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6810. It is listed in SM 9-1-6800.

*c. Uses.*

- (1) It is a component of a sulfuric-nitric acid solution to remove slight tarnish and thin corrosion from copper and its alloys.

- (2) To the above acid solution can be added common salt (sodium chloride) to produce a lustrous finish on copper alloys.
- (3) It is used with water to form a nitric acid bath used for decoating optical elements. Refer to TM 9-1501.
- (4) It is used with water to clean solid-type sparkplug gaskets.

**Caution:** Nitric acid dissolves most metals with the evolution of brownish-red fumes.

**Warning:** Nitric acid is an oxidizing and a highly corrosive liquid. It should be stored in glass bottles. Do not inhale nitric acid fumes. In case this acid is splashed on skin or in eyes, flush with water for at least 20 minutes. Get medical attention. Phosphine (hydrogen phosphide), a colorless, poisonous gas, forms very readily when any mineral acid reacts with metals or alloys containing phosphorus. The amount of phosphine released from the acid bath increases with increase in temperature and in concentration of the acid. Since this gas is a dangerous fire, explosive, and toxic hazard, adequate ventilation must be provided.

#### 45. Orthophosphoric Acid, Technical (O-P-313, Grade A)

*a. Characteristics.* This is a mixture of orthophosphoric acid and water. The mixture commonly referred to as concentrated phosphoric acid contains approximately 85 percent acid. This is a colorless, odorless liquid, free from sediment.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Uses.*

- (1) It is used to prepare 1 percent diphenylbenzidine indicator that is used in determining zinc content of zinc-base phosphatizing solutions. Refer to TM 9-208-1.
- (2) It is used as a phosphoric acid pickle solution to clean and etch magnesium-alloy die castings.

**Warning:** This is a corrosive liquid. If acid comes in contact with the skin, flush the affected area immediately

with clean water for at least 20 minutes. Get medical attention. Personnel must wear goggles, rubber gloves, and rubber aprons when working with acids or acid solutions. The reaction of the acid with metals or alloys containing phosphorus may form phosphine (hydrogen phosphide). This is a colorless, poisonous gas that is a dangerous fire, explosive, and toxic hazard. It must be removed by adequate ventilation.

**46. Paper, Lens: Tissue, Sheet Form (UU-P-313c, Type IV)**

*a. Characteristics.* This is a white, long-fiber tissue paper, of a heavy, wet-strength type. It is available in books containing 100 sheets 4½ x 5 inches in size.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 6540. It is listed in SM 10-1-6500.

*c. Use.* It is used for heavy-duty wet cleaning of optical glass of sighting and fire control materiel.

**47. Paper, Watchmaker's: No Lint**

*a. Characteristics.* This is a white, soft-finish tissue paper. It is free from grit and lint. The paper is available in 4¼ x 4¼-inch sheets for pocket watches and 3½ x 3½-inch sheets for wrist watches.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 9310. It is listed in SM 10-1-9300, 9400.

*c. Use.* It is used for drying and cleaning components of pocket and wrist watches.

**48. Polish, Automobile: Liquid (P-P-546a)**

*a. Characteristics.* This is a combination polish and cleaner containing a wax. It is an aqueous emulsion having a finely divided but mildly abrasive material in suspension. The odor is not objectionable.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7930. It is listed in SM 10-1-7900, 8000.

*c. Use.* It is used to clean and polish baked synthetic-enamel and lacquer surfaces of automotive bodies. It is not to be used on lusterless finishes such as those used on military motor vehicles.

**Caution:** Must be protected from freezing.

**49. Polish, Metal: Paste (P-P-556, Type III)**

*a. Characteristics.* This is an iron-oxide-base paste of fine consistency and mild abrasive action.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7930. It is listed in SM 10-1-7900, 8000.

*c. Use.* It is used to remove tarnish and to polish metal surfaces, such as brass, nickel, copper, etc.

**50. Potassium Sodium Tartrate, Tetrahydrate, Technical: (Rochelle Salts)**

*a. Characteristics.* This compound consists of translucent crystals or white crystalline powder. It has a saline taste and is soluble in water.

*b. Supply Data.* This is a Navy item in FSC 6810. It is listed in Navy stocklist of general stores FSC group 68.

*c. Use.* It is used in the cleaning of coils for phosphatizing tanks.

**51. Rag, Wiping: Cotton (DDD-W-415a, Class 1 or 2)**

*a. Characteristics.* This is a soft and absorbent cloth, usually composed of light clothing rags, free from dust, alkali, and corrosive agents and thoroughly sterilized. Bale or bag of rags is predominantly cotton but may contain blended cotton-rayon, cotton-silk, or other absorbent fabrics.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7920. It is listed in SM 10-1-7900, 8000.

*c. Uses.*

- (1) It is used as a substitute for cotton waste for use on automotive equipment and machinery, especially where lint deposits may affect operation.
- (2) It is used for washing materiel where strong soap, lye, and other alkaline materials are used.

**52. Remover, Paint: Alkali-Organic Solvent Type (MIL-R-12294A)**

*a. Characteristics.* This is a nonflammable, nonhardening, water-rinsable mixture composed of alkaline compounds, wetting agents, organic solvents, and thickening agents.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8010. It is listed in SM 9-1-8000.

*c. Uses.*

- (1) It is used primarily for the removing of multiple coats of paint from motor vehicles.
- (2) It is used for removing paint (lacquers, enamels, varnishes, synthetics) from silicate-base materials such as glass, concrete, and brick surfaces.

**Warning:** This paint remover contains a volatile solvent and should be used with adequate ventilation. It contains caustic soda (lye), avoid contact with skin, eyes, and clothing. Use goggles and rubber protective clothing. In case of contact, flush skin or eyes immediately and thoroughly with water for at least 20 minutes. Get medical attention.

**53. Remover, Paint: Alkali-Type (TT-R-230)**

*a. Characteristics.* This is a granular, alkaline product. At the specified concentration in hot water, it will remove paint coatings from metallic surfaces. It is issued in two classes, 1 and 2.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8010. It is listed in SM 9-1-8000.

*c. Uses.*

- (1) Class I—This is used for general heavy-duty stripping of paint (lacquers, varnishes, enamels, and synthetics) from ferrous metals.
- (2) Class 2—This is used for stripping paint (lacquers, varnishes, enamels, and synthetics) from aluminum and other nonferrous metals.

**Warning:** Class 1, paint remover contains caustic soda (lye). If the paint remover solution is splashed on the skin, flush immediately with plenty of water for at least 20 minutes. Get medical attention. The class 1 remover must not be used for nonferrous metals. Such use will not only damage the metal but may cause an explosion.

**54. Remover, Paint: Organic Solvent, Nonflammable (TT-R-251d, Type III, Class A or B)**

*a. Characteristics.* This is a nonflammable liquid consisting of a mixture of organic sol-

vents with paintable retarders of evaporation. It will not stain or raise the grain of wood.

*b. Supply Data.* This is a Corps of Engineer item in FSC 8010. It is listed in SM 5-1-8000.

*c. Use.* It is used to remove paint or varnish from wood and metal. It will leave the surface suitable for refinishing without further preparation.

**55. Rinsing Solution, Watch: Liquid, Watch-Cleaning (MIL-C-16553A)**

A cleaning solution, Type I, and a rinsing solution, Type II, of the above specification are prescribed in *a*, *b*, and *c* below.

*a. Characteristics.*

- (1) *Watch-Cleaning Solution, Type I.* This is a clear, nonfoaming, waterless-type cleaning solution containing 8 to 10 percent of suitable ammonium and/or amine soaps in a hydrocarbon solvent.
- (2) *Watch-Rinsing Solution, Type II.* This is a hydrocarbon-base solvent having a minimum flash point of 85° F. The rinsing solution completely removes the cleaning solution and will not corrode copper or steel.

*b. Supply Data.* These are Ordnance Corps items in FSC 6850. They are listed in SM 9-1-6800.

*c. Uses.*

- (1) Type I solution is used in a watch-cleaning machine to remove grease, gum, and dirt prior to rinsing with watch rinsing solution.
- (2) Type II solution is used in a watch-cleaning machine following treatment with watch-cleaning solution.

**Warning:** This is a flammable liquid. Keep away from open flame. Use with adequate ventilation.

**56. Rubbing Compound, Lacquer: Paste (TT-R-771)**

*a. Characteristics.* It is a stable liquid or paste containing a finely divided abrasive. It will not attack lacquered or aluminum surfaces.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Use.* It is used to clean and polish lacquered and aluminum surfaces.

## 57. Soap, Automobile and Floor (P-S-598b)

*a. Characteristics.* This is a soap made solely from neutral vegetable oils. It is available as a translucent liquid or in paste form. It has no objectionable odor, even after storage, when kept in a closed container. The soap contains neither solvents nor oils that will damage rubber parts and lacquered or enameled surfaces.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7930. It is listed in SM 10-1-7900, 8000.

*c. Use.* It is mixed with water to clean materials with lacquered or enameled finishes.

## 58. Soap, Saddle: Paste (P-S-609a)

*a. Characteristics.* This is a paste consisting of soap, waxes, and oils in aqueous emulsion.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7930. It is listed in SM 10-1-7900, 8000.

*c. Uses.*

- (1) It is used for cleaning, preserving, and moldproofing leather.
- (2) Used to remove grease and oil from canvas.

## 59. Sodium Cyanide, Technical (O-S-591)

*a. Characteristics.* This is a white granular substance which is usually fused into ball-shaped pieces. It is soluble in water. It is odorless when dry. It tends to absorb water from the air and emit a slight odor of bitter almonds.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Uses.*

- (1) It is used for removing carbon, lead, and other foreign matter from aluminum boosters and other aluminum parts when simple immersion in solvents and cleaners is not effective.
- (2) It is used for the purposes indicated in (a) and (b) below in connection with cleaning and black finishing of ferrous metals. Refer to TM 9-208-1.
  - (a) It is added to a low-temperature dichromate-finish solution when used to prevent rust.
  - (b) It may be used in a water solution to remove smut from parts which have been black-oxide finished.

- (3) It is used in a hot, molten bath for heating steel tools uniformly, preparatory to hardening by the quenching method, or for producing a very hard outer surface on low-carbon-steel parts by carburizing a thin outer skin of the steel.

**Caution:** It should be kept in tightly sealed containers.

**Warning:** Sodium cyanide is a violent poison. Sodium cyanide and solutions containing sodium cyanide are extremely poisonous. Swallowing a small amount of the sodium cyanide will cause death. The solutions may give off irritating and dangerous fumes. Avoid breathing these fumes. Waste solutions containing cyanide should not be emptied into sewage systems. There is grave danger of contact with acidulated water which will release hydrogen cyanide gas. This gas may be lethal in concentrations exceeding 10 parts per million. Sewage disposal into fresh-water streams and rivers may result in the destruction of animals and fish. Cyanide wastes must be chemically treated to reduce or nullify the lethal properties of the cyanide.

## 60. Sodium Hydroxide, Technical (P-S-631, Type II)

*a. Characteristics.* This is a highly caustic, crystalline compound issued in the form of powder or flakes. It is deliquescent and when dissolved in water generates a large amount of heat. This is a grade of sodium hydroxide containing not more than 2 percent sodium carbonate. It contains not less than 96 percent of sodium hydroxide. It is known as caustic soda, lye, or white caustic.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Uses.*

- (1) It is used to remove oxide coatings and corrosion from small aluminum-alloy parts by dipping first in a sodium hydroxide solution and then in a nitric acid solution, each bath followed by dipping the part in hot water.



- (2) It is used as a component of a solution used to clean the coils of the phosphatizing tanks.
- (3) It is a component of a solution used to produce a low-temperature dichromate finish on rifle gas cylinders.
- (4) It is used as a component of an anodic treatment solution that is used in Type V treatment of magnesium-alloy parts to prepare them for painting.
- (5) It is used for removing graphite-base lubricants from hot-formed magnesium parts.
- (6) It is used as a component of an alkaline cleaner for magnesium-alloy parts. Refer to MIL-M-3171A.

**Caution:** It should be kept in tightly sealed containers.

**Warning:** Sodium hydroxide causes severe burns to skin and eyes. In case of contact with skin, flush affected area immediately with water for at least 20 minutes. Get medical attention.

#### **61. Sodium Carbonate, Anhydrous, Technical (O-S-571, Type I)**

*a. Characteristics.* This is a white, odorless, alkaline powder or granules. It is soluble in water but not in alcohol. Solutions of sodium carbonate in water will attack aluminum and remove galvanized finishes. This compound contains a minimum of 99.2 percent sodium carbonate.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Uses.*

- (1) It is used for neutralizing acid products in vapor-degreasing equipment and reclaiming trichloroethylene which contains free acid. Refer to TM 9-208-1.
- (2) It is used in a cleaning solution, consisting of sodium carbonate, sodium hydroxide, and water. This solution is used as a hot soak as an intermediate step in producing certain Dow-type finishes on magnesium-alloy items.
- (3) It is used to prepare an alkaline cleaning solution for magnesium-alloy parts. Refer to MIL-M-3171A.

#### **62. Sodium Metasilicate Anhydrous, Technical**

*a. Characteristics.* This compound occurs as colorless crystals that are soluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used to prepare an alkaline rinse to remove traces of acid from magnesium-alloy parts that have been treated with a bright pickle solution preparatory to welding.

#### **63. Sodium Nitrate, Technical: Granular or Pellets (O-S-634)**

*a. Characteristics.* This compound consists of colorless, transparent granules or pellets. It is soluble in water and in deliquescent.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Uses.*

- (1) It is a component of an acetic-nitrate pickle solution used to remove mill scale and other surface contamination from magnesium-alloy sheets, other wrought forms, and solution-heat-treated castings.
- (2) It is a component of a chromic-nitrate pickle solution used to remove burned-on graphite lubricants from magnesium-alloy parts.
- (3) It is used in a solution of chromium trioxide, sodium nitrate, and calcium or magnesium fluoride for cleaning magnesium-alloy items after degreasing to prepare them for arc or gas welding.
- (4) It is a component of a chromium trioxide, sodium nitrate, and calcium or magnesium fluoride solution used to clean magnesium-alloy parts before brazing.

**Caution:** It should be kept in tightly closed containers.

#### **64. Sodium Phosphate, Tribasic, Anhydrous, Technical (O-T-00671)**

*a. Characteristics.* This is a granular compound which is colorless or white.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-5-6800.

*c. Uses.*

- (1) It is used in a water solution for cleaning glassware and painted or lacquered metal surfaces.
- (2) It is used with water to *clean* painted or varnished wood surfaces.
- (3) It is used in water to remove paint from metal surfaces.

**Caution:** The use of strong alkaline solutions (as described in (2) above) is not recommended for removing paint from wood surfaces, since the alkali will attack the fibers, causing swelling and discoloration.

**65. Sodium Pyrophosphate Anhydrous, Technical**

*a. Characteristics.* This compound consists of colorless, transparent crystals or white granules. It is soluble in water. It is not soluble in alcohol. The solution is alkaline.

*b. Supply Data.* This is a Navy item in FSC 6810. It is listed in Navy Stock List of General Stores FSC Group 68.

*c. Use.* It is a component of a solution used to remove the slight oxide deposit "smoke" formed during arc welding from magnesium-alloy parts.

**66. Sponge, Natural: Unbleached (C-S-631b)**

*a. Characteristics.* This sponge consists of a light, porous, elastic, marine-animal growth that has a large liquid-absorption capacity. It becomes soft when wet without losing its original shape.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7920. It is listed in SM 10-1-7900, 8000.

*c. Use.* Sponges are used to apply mild cleaning solutions to surfaces for cleaning purposes.

**Caution:** Strong alkaline solutions, such as those containing sodium carbonate, sodium hydroxide, or dibasic sodium phosphate, will attack and damage natural sponges.

**67. Sponge, Vinyl: Coarse-Pore, Compressed Rectangular (MIL-S-11036, Type I, Class 2)**

*a. Characteristics.* This sponge consists of polyvinyl formal-base resin and coloring matter

without added filler. It is highly resistant to solvents, such as gasoline, acetone, and mineral spirits paint thinner or drycleaning solvent, and to diluted solutions of hydrochloric acid, sulfuric acid, sodium hydroxide, and tribasic sodium phosphate. As issued, the sponges are compressed to approximately one-fifth the thickness that they assume when immersed in water.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7920. It is listed in SM 10-1-7900, 8000.

*c. Use.* They are used in the cleaning of surfaces.

**68. Sulfuric Acid, Technical (O-A-115, Class A, Grade 1)**

*a. Characteristics.* This is a highly corrosive liquid consisting of sulfuric acid and water. This is also known as concentrated sulfuric acid. The percent of sulfuric acid is 93 percent by weight. It has a specific gravity of 1.835.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6810. It is listed in SM 9-1-6800.

*c. Uses.*

- (1) It is used to replenish a galvanic anodizing solution (sulfate-dichromate-hydroxide bath) which is used for type IV protective treatment of magnesium alloys. Refer to MIL-M-3171A.
- (2) It is used in a bright-dipping solution for copper and its alloys.
- (3) It is mixed with water to make a sulfuric acid pickling solution to remove the effect of blasting operations from magnesium-sand castings.
- (4) It is used as a component of a solution of chromium trioxide, sulfuric acid and water, used to clean magnesium alloys before spot welding.
- (5) It is mixed with water and used to remove welding flux from aluminum alloys.
- (6) It is used in a solution of nitric and sulfuric acid, used to remove the effects of sand-blasting cleaning operations from magnesium alloys, before any machining operations.

**Warning:** This is a corrosive liquid. If acid comes in contact with skin or eyes, flush

the affected area with clean water for at least 20 minutes. Get medical attention. Personnel must wear goggles, rubber gloves, and rubber aprons when working with acids or acid solutions.

#### 69. Swab, Small Arms Cleaning: Cotton

*a. Characteristics.* This is a good grade of unbleached, single-base, napped flannel cotton. It has properties similar to cotton textile tape (par. 71), which may be substituted in an emergency. Swabs are 2½ inches square.

*b. Supply Data.* This is an Ordnance Corps item in FSC 1005. It is the responsibility of the Ordnance Weapons Command.

*c. Use.* Swabs are used for cleaning bores of small arms up to and including 20-mm guns.

#### 70. Sweeping Compound: Oil- and Water-Absorbing (MIL-C-15043 (Ships))

*a. Characteristics.* This is a stable, uniform mixture of minerals of the silicate type. It will not cake during storage nor when exposed to humid atmospheres in open containers.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7930. It is listed in SM 10-1-7900, 8000.

*c. Use.* It is used on floors, of concrete, steel, and wood to absorb oil, water, and oil-water mixtures and will pick up dust when swept up. It is also spread on the floor under vehicles to absorb the drippings.

#### 71. Tape, Textile: Cotton, Plain Weave

*a. Characteristics.* This is a single nap, unbleached, cotton flannel cloth. It is 4 inches wide.

*b. Supply Data.* This is a quartermaster Corps item in FSC 8315. It is listed in SM 10-1-C2-3A.

*c. Uses.*

- (1) It is cut into suitable size and used for cleaning barrels of machine guns and shotguns.
- (2) It may be substituted for small arms cleaning swabs (par. 69).

#### 72. Tetrachloroethylene, Technical (O-P-191)

*a. Characteristics.* This is a clear, nonflammable liquid with an etherlike odor. It has a boiling point of 250° F. It is a solvent of grease and oils in its normal liquid state or when

vaporized by heat. It is commonly called perchlorethylene.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used in vapor-degreasing equipment for the removal of oil, grease, and oil-bearing dirt from metallic parts.

**Warning:** Vapors of this liquid are harmful. Avoid repeated or prolonged breathing of vapor or contact with skin. Use in well-ventilated areas.

#### 73. Thinner, Paint, Mineral Spirits (TT-T-291a, Grade 1)

*a. Characteristics.* This is a clear, flammable, completely volatile petroleum derivative. It is not toxic.

*b. Supply Data.* This is a Corps of Engineers item in FSC 8010. It is listed in SM 5-1-8000.

*c. Uses.*

- (1) It is used for removing oil and grease from metal surfaces by brushing, wiping, or immersion.
- (2) It is used for thinning oleoresinous paints and varnishes, and for cleaning brushes and equipment used in the application of such finishes.
- (3) It is used as a substitute for dry-cleaning solvent.

**Warning:** This is a flammable liquid. Keep away from open flame.

#### 74. Toluene, Technical

*a. Characteristics.* This is a colorless, refractive liquid with a benzenelike odor. It is also called toluol.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-5-6800.

*c. Uses.*

- (1) It is used to clean brushes that were used with toluene thinned paints.
- (2) It may be used as a substitute for Thinner, Paint, Mineral Spirits and Thinner, Enamel, Synthetic.

**Warning:** This is a flammable liquid. Keep away from heat and open flame. Use with adequate ventilation. Avoid repeated or prolonged contact with skin. Avoid prolonged breathing of vapors.

## 75. Trichloroethane, Technical (O-T-620)

*a. Characteristics.* This is a nonflammable and noncorrosive, inhibited, clear, colorless liquid. It has a mildly sweet odor. It has an initial boiling point of 72° C. (161.6° F.) minimum. The vapors are toxic.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-5-6800.

### *c. Uses.*

- (1) It is used to clean electrical parts, insulation, and wiring. It should be used instead of carbon tetrachloride.
- (2) It is used to clean type face of type-writer keys.

**Warning:** The vapors are toxic. Avoid prolonged or repeated breathing of vapors. Avoid repeated contact with skin. Use with adequate ventilation.

## 76. Trichloroethylene, Technical (O-T-634, Type II)

*a. Characteristics.* This is a clear, nonflammable liquid that in its normal liquid state or when vaporized by heat is a strong solvent of oils and greases. Its vapors have a chloroform-like odor and are toxic.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

### *c. Uses.*

- (1) It is used in vapor-degreasing equipment for the removal of oil, grease, and oil-bearing dirt from metallic parts.
- (2) It is used to remove fungus from electrical connectors.

**Warning:** The vapors are harmful. Use only with adequate ventilation and avoid prolonged or repeated breathing of the vapors. Avoid repeated or prolonged contact with the skin.

## 77. Turpentine: Gum Spirits (TT-T-801)

*a. Characteristics.* This is a colorless, flammable, and volatile liquid obtained by distillation of the gum obtained from living pine trees.

*b. Supply Data.* This is a Corps of Engineers item in FSC 8010. It is listed in SM 5-1-8000.

### *c. Uses.*

- (1) It is used as a paint thinner.
- (2) It is used to remove grease and oil from painted or unpainted wood surfaces.
- (3) It is used to clean paint brushes.

**Warning:** This is a flammable liquid. Keep away from open flame.

## 78. Type Cleaner: Plastic

*a. Characteristics.* This is a soft, nontacky, moldable plastic compound.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7510. It is listed in SM 10-1-7500.

*c. Use.* This cleaner, when pressed into the type face, removes the dried ink and residue from the type. The plastic cleaner is then kneaded to incorporate the ink and to present a clean area.

## 79. Waste, Matted Yarns: Cotton, Colored

*a. Characteristics.* This is a textile material composed of dyed or undyed, soft, cotton yarns mixed into a homogeneous mass. It has a tendency to shed lint during use and must not be used where this lint will affect operation of materiel.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 9450. It is listed in SM 10-1-9300, 9400.

*c. Use.* It is used for general wiping and cleaning where a better grade of cotton waste or lintless material (wiping rag) is not required.

## 80. Waste, Matted Yarns: Cotton, White

*a. Characteristics.* This is a textile material composed of new, fine, undyed, bleached or unbleached, soft cotton yarns mixed into a homogeneous mass. It contains no dirt or rags.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 9450. It is listed in SM 10-1-9300, 9400.

### *c. Uses.*

- (1) It is used for general wiping and cleaning where lintless material (wiping rag) is not required.
- (2) It is used as a substitute for sponges for washing materiel where strong

soap, lye, and other alkaline materials are used.

## 81. Xylene, Technical

*a. Characteristics.* This is a colorless, flammable liquid. It has a slower evaporation rate than toluene. It is also called xylol.

*b. Supply Data.* This is a Quartermaster

Corps item in FSC 6810. It is listed in SM 10-1-6800.

*c. Use.* It is used to clean paint brushes which were used with paint thinned by xylene.

**Warning:** This is a flammable liquid. Keep away from heat and open flame. Use with adequate ventilation. Avoid repeated or prolonged contact with the skin. Avoid prolonged breathing of the vapors.

## CHAPTER 3

### PRESERVATIVE MATERIALS

---

#### Section I. GENERAL

##### 82. Scope

Preservative materials are used to protect ordnance materiel from corrosion, fungi, rusting, and freezing. The materials covered in this chapter do not include either packaging materials, even though they may be used for preservation during storage, or greases, oils, or waxes which are in FSC 9150 or 9160. For petroleum, petroleum-base products, and related materials in FSC 91, refer to Federal supply catalog C 4-1.

##### 83. Preservation Procedures

The methods of preservation, use, and makeup of solutions and compounds are described in detail in TM 9-209 unless otherwise indicated.

##### 84. Precautions

The precautionary notes which are found in some of the following paragraphs indicate the extent of first aid which should be given in most instances. They also indicate hazards to personnel using these materials. Protective clothing must be worn when working with acids, acid solutions, or high caustic materials.

#### Section II. CHARACTERISTICS, SUPPLY DATA, AND USE OF PRESERVATIVE MATERIALS

##### 85. Ammonium Sulfate, Technical

*a. Characteristics.* This compound consists of colorless, odorless crystals or white granules. It is soluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used as a component of a galvanic anodizing solution that is used in type IV treatment of magnesium-alloy parts to protect them against corrosion. Refer to MIL-M-3171A.

##### 86. Antifreeze: Artic (MIL-C-11755)

*a. Characteristics.* This is a yellow liquid composed of ethylene glycol, a complex alcohol, distilled or deionized water, and a small percentage of borax. It has a minimum boiling point of 230° F. This material is ready for use as issued and must not be diluted with any other liquid.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used in internal-combustion-engine cooling systems and water-cooled machinegun jackets for protection against freezing in regions where the ambient temperatures range from minus 40° to minus 97° F.

**Caution:** The antifreeze must not be kept in the cooling system of operating vehicles during the warm weather period.

##### 87. Antifreeze: Ethylene Glycol to minus 52° F. (O-A-548a)

*a. Characteristics.* This is a blue-green liquid, composed of various glycols plus a corrosion-inhibiting compound. The maximum freezing point is minus 52° F, when mixed with water as described in TM 9-2858.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used in the water-cooled internal-combustion-engine cooling systems and water-cooled machinegun jackets.

*Note.* This material will freeze at temperatures below 0° F. This will not damage the container or its

contents. The material cannot be poured under these conditions and must be permitted to thaw out.

### **88. Belt Dressing, Leather: Stick Form (O-L-169, Type S)**

*a. Characteristics.* This is a compound in stick form that will retain its shape at temperatures up to 120° F. It preserves the leather and prevents belt slippage.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 8030. It is listed in SM 10-1-7900, 8000.

*c. Use.* It is used on the contacting surfaces of leather belts of power and manufacturing equipment while in operation.

### **89. Coating Compound, Bituminous Solvent Type: Chassis Coating (TT-C-520)**

*a. Characteristics.* This is a black, viscous compound composed of petroleum, short asbestos fibers, inert mineral powder, and petroleum hydrocarbon solvents. It can be sprayed or brushed. A one-sixteenth-inch-thick film of the compound will set-to-touch in 4 hours and reach practical hardness in 24 hours.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is applied in one thick coat approximately one-eighth-inch thick, on the under side of hoods, fenders, floors, etc., of motor vehicles to deaden noise; to act as a seal against fumes; and to protect the metal from corrosion. (Refer to TB ORD 401.)

### **90. Coating Compound, Oxide Black: Powder, Bearing Surface, Hot Dip (MIL-F-13924A)**

*a. Characteristics.* This is an alkaline mixture in powder form containing oxidizing agents. It is soluble in water.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used in the oxide-black-finishing process to produce a black, nonmetallic, corrosion-resistant finish on ferrous metals, such as the exterior metal surfaces of small arms. This finish is particularly suited for moving parts that cannot tolerate the dimensional buildup of more corrosion-resistant finishes. Refer to TM 9-208-1 for detailed description of this process.

**Warning:** This is oxidizing material. It yields oxygen readily to stimulate the combustion of organic material. Keep away from heat, open flame, and sparks. It also contains caustic soda (lye).

### **91. Coating Compound, Oxide Black: Powder, Nonbearing Surface, Hot Dip**

*a. Characteristics.* This is a mixture which deposits a protective oxide coating on copper alloys.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used for coating copper alloys and items electroplated with copper, with a black oxide finish. Refer to TM 9-208-1 for description of this process.

**Warning:** This is an oxidizing material. It yields oxygen readily to stimulate the combustion of organic material. Keep away from heat, open flame, and sparks. It also contains caustic soda (lye).

### **92. Corrosion Preventive, Fingerprint Remover (MIL-C-15074A)**

*a. Characteristics.* This is a clear, homogeneous, stable liquid. It is free from disagreeable and offensive odors and is not injurious to persons using it provided reasonable procedures and safety precautions are used.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Uses.*

- (1) It is used to remove fresh fingerprint residues from finished parts and polished surfaces.
- (2) It is used for suppressing corrosion that has developed as a result of the fingerprint residues.
- (3) It is used as a temporary and easily removable preservative for steel.

**Warning:** This is a flammable liquid. Keep away from heat and open flame. Use with adequate ventilation.

### **93. Ethylene Glycol, Technical (CML-PD-4-439)**

*a. Characteristics.* This is a colorless, syrupy liquid. It is miscible in water. It has a specific gravity of 1.1156 at 20°/20° C.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used as a component of an anodic treatment solution that is used in Type V treatment of magnesium alloy. Refer to MIL-M-3171A.

#### **94. Gum Preventive Compound, Gasoline (MIL-G-14418)**

*a. Characteristics.* This is an inhibiting material which retards the formation of gum in gasoline.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used as an additive to gasoline in vehicle fuel tanks to retard the formation of gum during short-term storage or shipment.

#### **95. Leather Dressing, Mildew-Preventive: Paranitrophenol, Liquid (O-L-164a, Type II, Class A or B)**

*a. Characteristics.* This is a stable, non-flammable solution composed of mineral and animal oils, a fungicide (paranitrophenol), and suitable solvents. It contains a toxic solvent.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 8030. It is listed in SM 10-1-7900, 8000.

*c. Uses.*

- (1) It is used to prevent growth of mildew on leather and leather products *that are not to be used in prolonged and intimate contact with the skin.*
- (2) It is used to improve the resistance of the leather to cracking and the deleterious effects of water and fungi that produce mildew.

**Warning:** Breathing of the vapors from the dressing should be avoided. The treated leather should be dried in the open air.

#### **96. Linseed Oil, Raw (TT-O-369)**

*a. Characteristics.* This is a yellow to greenish-brown vegetable oil obtained from the seeds of the flax plant. When a film of the oil is exposed to the atmosphere, it gradually darkens and thickens to form a tough and flexible film.

*b. Supply Data.* This is a Corps of Engineers item in FSC 8010. It is listed in SM 5-1-8000.

*c. Uses.*

- (1) It is used for the preservation of wood stocks on guns and similar wooden items. Refer to TB ORD 623.
- (2) It is used for treating the inner packing of some chests and lockers in hot areas, both humid and dry.
- (3) It is used to form a foam blanket that suppresses splashing of black-oxide finishing solutions. Refer to TM 9-208-1.

**Warning:** Cloths used to apply or remove linseed oil are fire hazards, because they may ignite by spontaneous combustion. Cloths should be either destroyed after use or hung up to dry in a well-ventilated place and stored in metal containers.

#### **97. Mildew Resistant Compound, Textile: Paste Form, Fire, Water and Weather Resistant (MIL-C-13295, Type I)**

*a. Characteristics.* This is a uniformly dispersed compound in paste form, containing pigments, binders, water repellents, and fungicides. It does not corrode brass or galvanized iron and does not have any deteriorating action on wood. This paste is reduced to spray consistency by mixing with a petroleum solvent.

*b. Supply Data.* This is a Corps of Engineers item in FSC 8030. It is listed in SM 5-1-8000.

*c. Use.* It is used to protect cotton duck and webbing from deterioration by water, weather, or mildew.

#### **98. Naphthalene, Technical (R-N-91)**

*a. Characteristics.* This is a white crystalline substance obtained from coal tar. It vaporizes slowly at ordinary temperatures and has a strong coal tar odor.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used to prevent damage by moths to fabrics and brushes. It must be used in a confined area.

#### **99. Neat's-Foot Oil (C-N-200)**

*a. Characteristics.* This is a clear, pale-yellow oil obtained from bones and hoofs of cattle. It is free from rancidity, and the odor is not objectionable.



*b. Supply Data.* This is a Quartermaster Corps item in FSC 8030. It is listed in SM 10-1-7900, 8000.

*c. Use.* It is used for the softening and preservation of leather items, such as holsters, gun slings, and other leather equipment.

*Note.* It is not a satisfactory lubricant for any purpose.

#### **100. Phosphate Coating, Metal (MIL-C-50002)**

*a. Characteristics.* This is a colorless solution of zinc dihydrogen phosphate and a nitrate accelerator.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Uses.*

(1) It is used to produce a type Z, MIL-P-16232, zinc-phosphate-type finish on ferrous metals.

(2) It is used to produce a smooth, corrosion-resistant finish on small arms, fire control, and artillery parts.

**Caution:** This material must be kept from freezing. Do not use this compound on electrical wiring, coil-steel springs or other spring steels.

#### **101. Potassium Cyanide, Technical Granular**

*a. Characteristics.* This is a white granular compound that is soluble in water. It tends to absorb water from the air. It has an odor of oil of bitter almonds.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used in a hot molten bath for heating steel tools uniformly preparatory to hardening by true quenching methods or for producing a very hard outer surface on low-carbon-steel parts by carburizing a thin outer skin of the steel.

**Caution:** The container should be tightly closed.

**Warning:** Potassium Cyanide is a violent poison. Swallowing a small amount of potassium cyanide will cause death.

#### **102. Potassium Dichromate, Technical**

*a. Characteristics.* This compound consists of orange-red crystals or granules that are soluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It may be used for a substitute for sodium dichromate for molten dichromate black finishing of corrosion-resistant steel. It requires a higher temperature than sodium dichromate. Refer to TM 9-208-1.

**Warning:** This material is poisonous.

#### **103. Potassium Nitrate, Technical Powdered**

*a. Characteristics.* This is a white crystalline powder with a salty taste. It is soluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used as a component of low-temperature dichromate finish solution used to protect ferrous metals against corrosion. Refer to TM 9-1861.

**Warning:** This is an oxidizing material. It can cause fires and explosions in combination with organic or other oxidizable materials.

#### **104. Preservative, Oil, Hydraulic Systems (MIL-P-12098)**

*a. Characteristics.* This is a homogeneous and uniform product composed of a 50/50 mixture of castor oil and normal butyl alcohol containing hydroquinone as an antioxidant and inhibitor.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is used for preserving hydraulic brake parts when packed for warehouse storage.

#### **105. Rust Arresting Coating (MIL-R-10036)**

*a. Characteristics.* This is a clear liquid composed of drying and semidrying oils and driers. This compound is diluted with a petroleum solvent to a brush or spray consistency. The compound will set to touch in 3 hours and dry to a hard film in 24 hours.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is used on rusted metal and painted surfaces to arrest further corrosion.

#### **106. Sodium Dichromate, Dihydrate, Technical Granular (O-S-595)**

*a. Characteristics.* This compound consists of red crystals that are soluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Uses.*

- (1) It is used as a component of low-temperature dichromate finish solution for ferrous metals. Refer to TM 9-208-1.
- (2) It is used, as a molten bath, to produce a black finish on corrosion-resisting steel. Refer to TM 9-208-1.
- (3) It is used as a component of a chromate-pickle solution used to clean traces of flux from magnesium-alloy items after gas welding.
- (4) It is used as a component of a chrome-pickle bath for treating magnesium-alloy sand-mold, permanent-mold, and die castings and wrought magnesium-alloy parts to protect them against corrosion. Refer to MIL-M-3171A.
- (5) It is used as a component of a chrome pickle solution for treatment of magnesium-alloy parts before painting. Refer to MIL-M-3171A, type I.
- (6) It is used as a component of a galvanic anodizing solution that is used in Type IV treatment of magnesium-alloy parts to protect them against corrosion. Refer to MIL-M-3171A.
- (7) It is used as a component of a neutralizing bath for treating magnesium-alloy parts after Type V corrosion-protective treatment and before painting. Refer to MIL-M-3171A.

## **107. Sodium Oxalate ACS**

*a. Characteristics.* This is an odorless, white crystalline powder. It is soluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used as a component of an anodic treatment solution that is used in Type V treatment of magnesium-alloy parts to prepare them for painting. Refer to MIL-M-3171A.

## **108. Surfacer, Liquid: Lacquer Type (MIL-S-974)**

*a. Characteristics.* This is a mixture of varnish, drying oils, and pigments in addition to a volatile solvent.

*b. Supply Data.* This is a Corps of Engineers item in FSC 8010. It is listed in SM 5-1-8000.

*c.* It is used in connection with sanding operations to establish a smooth surface for painting.

## **109. Talc, Technical: Powdered (ZZ-T-416a, Type IV, Class C)**

*a. Characteristics.* This is a finely powdered, native hydrous magnesium silicate. It is white to grayish white, odorless, and insoluble in water.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6810. It is listed in SM 9-1-6800.

*c. Use.* It is used to dust rubber items to keep their surfaces from being sticky and to preserve them. Specific articles for which it is used are rubber eyepieces and face pieces, synthetic rubber gas check pads, and interior surfaces of tires when installing inner tubes.

## **110. Wadding, Creped Cellulose**

*a. Characteristics.* This is a soft crepe paper impregnated with a vinyl resin.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 8135. It is listed in SM 10-5-8100.

*c. Use.* It is used in connection with strippable plastic coating compound. Refer to TB ORD 574.

## **111. Water Repellent Compound, Textile Finish (MIL-C-1068A)**

*a. Characteristics.* This is a compound which produces a water-repellent finish on textiles. It is available in two types, Type I (aqueous) and Type II (solvent).

*b. Supply Data.* This is a Quartermaster Corps item in FSC 8030. It is listed in SM 10-1-7900, 8000.

*c. Use.* It is used to produce a water-repellent finish on textiles, such as webbing and canvas to prevent deterioration due to mold and moisture.

## **112. Wood Preservative, Pentachlorophenol Mixture (MIL-S-13518, Type II).**

*a. Characteristics.* This is a flammable liquid that has a minimum flash point of 100° F. The active ingredient is pentachlorophenol, which

is toxic. The compound is in ready-to-use form and has a drying time of 24 hours.

*b. Supply Data.* This is a Corps of Engineers item in FSC 8030. It is listed in SM 5-5-8000.

*c. Use.* It is used to treat unfinished wood surfaces to prevent deterioration by action of fungus- and mold-producing organisms. It can also be used for a base for paint.

## CHAPTER 4

### ABRASIVE MATERIALS

#### Section I. GENERAL

#### 113. Scope

This chapter contains information on uses and operating conditions under which these various abrasive materials are used. These abrasive materials include bands, belts, grains, powder, etc. They are listed in alphabetical sequence.

#### 114. Precautions

The precautionary notes found in some of the following paragraphs indicate the possible danger of malfunction of certain types of equipment, if the proper abrasive is not used.

#### 115. Description

*a.* Abrasives are hard, sharp materials that wear away a softer, less-resistant surface by rubbing or impact. Abrasives are either natural or manufactured materials as shown in (1) through (3) below.

- (1) Natural nonmetallic abrasives, such as garnet, flint, pumice, silicon, and diamonds, are mined in the form of crystal masses. Other natural abrasives are the softer polishing materials, such as rare earth, chalk, and iron oxide.
- (2) Synthetic nonmetallic products, such as silicon carbide and aluminum oxide, are types of electric furnace abrasives. Silicon carbide is produced in the form of crystals by heating carbon and sand in an electric furnace. Aluminum oxide is produced in the form of "pigs" by fusing a mineral ore called bauxite in an electric furnace.
- (3) Metallic materials, such as cast-iron grit and steel shot, are used in barrel-type blasting machines.

*b.* These crystal masses and massive "pigs" are broken up and crushed. By sifting through

screens of various sizes, the particles are graded to uniform sizes termed grains or grits. Abrasive grains are designated by grit number (grain size) or commercially by grade number (grain symbol). Abrasive grade numbers and corresponding grit numbers for silicon carbide, aluminum oxide, and garnet are listed in table I. Table II lists the grade numbers and equivalent grade designations for emery and flint.

*Table I. Conversion of Abrasive Grade and Grit Numbers for Silicon Carbide, Aluminum Oxide, and Garnet*

Grade number	Corresponding grit number		
	Silicon carbide	Aluminum oxide	Garnet
12/0	600	600	
11/0	500	500	
10/0	400	400	
	360		
9/0	320	320	
8/0	280	280	280
7/0	240	240	240
6/0	220	220	220
5/0	180	180	180
4/0	150	150	150
3/0	120	120	120
2/0	100	100	100
1/0	80	80	80
½	60	60	60
1	50	50	50
1½	40	40	40
2	36	36	36
2½	30	30	30
3	24	24	24
3½	20	20	20
4	16		
4½	12		

Table II. Grade Numbers and Equivalent Grade Designation for Emery and Flint

Grade number	Emery	Flint
4/0 to 3/0	-----	Extra fine (XF)
3/0 to 2/0	Fine (F)	Fine (F)
2/0 to 0	-----	
0 to ½	Medium (M)	Medium (M)
½ to 1	-----	
1 to 1½	Coarse (C)	Coarse (C)
1½ to 2	-----	
2 to 3	Extra coarse (XC)	Extra coarse (XC)
2½ to 3	-----	

c. The quality of an abrasive is determined by the characteristics described in (1) through (3) below.

- (1) Its effectiveness as an abrading, surface-preparing, or finishing medium.
- (2) Its ability to retain its abrading characteristics for a reasonable service period.
- (3) The ability of its grit particles to fracture when in contact with the abrading surface in a manner that will present new cutting faces. Silicon carbide, for instance, is an exceptionally fine abrasive from the standpoint of cutting power and its ability to fracture, so that new cutting surfaces are formed. It is, however, somewhat too brittle to stand up under heavy grinding service. Aluminum oxide, on the other hand, is not as hard as silicon carbide but breaks up into blocky particles, which are extremely tough. For these reasons, aluminum oxide is the most extensively used of all abrasives and particularly for the grinding and finishing of ferrous metals.

d. The coated abrasive products (bands, belts, cloth, disks, and paper) are either open or closed coated. A coated abrasive is open coated when the individual grains are set at a predetermined distance from one another and the surface coverage by the abrasive grain is about 50 to 70 percent. Closed or regular coating

completely covers the backing. The backings to which these grains are cemented may be cloth, paper, a combination of the two, or a fiber combination. The various types of backing are described in (1) through (4) below.

- (1) There are two grades of cloth used as backing, i.e., jeans and drills. Jean cloth is a lightweight, strong cloth. Drill cloth is a heavier, stronger, and more stretch-resistant cloth.
- (2) Combination backing is a strong paper stock combined with a light-weight cloth. This type of backing is required for sanding operations requiring a coated abrasive stronger than paper.
- (3) Fiber combination is vulcanized fiber combined with drills, having strengths far in excess of any paper or cloth. This type of backing is used mostly for disk-sanding operations on portable sanders where extremely high speeds and great stresses are encountered.
- (4) Paper backing is made of the strongest and toughest stock available. It must meet established standards as to tensile strength, adhesive and folding qualities, density, surface finish, resistance to tearing, and stretching properties. To meet a wide range of requirements the paper is furnished in the weights indicated below.

Classification	Weight (lbs)
A .....	40
C .....	70
D .....	90
E .....	130
Y .....	130

Paper backing of the 130-pound class is the strongest. Abrasive papers of the heavier weights are utilized where greater pressures are used for stock removal.

e. The coated abrasive products are severely reduced in efficiency when subjected to extremes of temperature and humidity in storage. For ideal storage conditions the temperature range is 62° to 78° F., and the humidity range from 34 to 52 percent. Every effort should be made

to avoid temperature and humidity extremes, and the following points should be observed.

- (1) Store these products in their original sealed packages until ready for issue or use.

- (2) Avoid storing them in open or direct sunlight.
- (3) Keep them off concrete floors and away from sources of heat, cold, or dampness.

## Section II. CHARACTERISTICS, SUPPLY DATA, AND USE OF ABRASIVE CLOTHS AND PAPERS; AND POLISHING AND GRINDING COMPOUNDS

### 116. Abrasive Cloth Assortment: Aluminum Oxide, Closed-Coat (Spec. P-C-451a, Type I, Class 1)

*a. Characteristics.* The cloth backing is completely covered on one side with aluminum oxide, bonded with animal gelatin adhesive. This assortment consists of twelve sheets ( $4\frac{1}{2} \times 5\frac{1}{2}$ -inch) of each of six different grit numbers.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-4-5350-S01.

*c. Uses.*

- (1) Grade 2/0 cloth and finer grades are used for removing rust and for cleaning and polishing iron and steel surfaces in ordinary machine operations. Properly qualified personnel may use grades as coarse as 2/0 for removing burs from threads of breechblocks and breech recesses, gas-check split rings, gas-check seats, steel shanks of slight mountings, bearing sleeves of range finders, and battery commanders' telescope tripods. No abrasive cloth coarser than 2/0 is permitted for work on breech mechanisms. Crocus cloth must be used for this purpose.
- (2) Grade 1/0 cloth and coarser are used, generally, for removing rust, burs, and other surface defects from unfinished iron and steel surfaces and for preparing such surfaces for paint finishes. These coarse sizes must never be used on highly finished surfaces.

**Caution:** Aluminum oxide cloth must not be used for abrading or finishing soft bearing metals, such as babbitt metal or brass. Aluminum oxide must not be used to polish com-

mutators of generators and motors because the dislodged grains could lodge under the brushes where they would cut deep scratches in the soft copper commutator and would also ruin the brushes.

### 117. Abrasive Paper Assortment: Flint, Closed-Coat (Spec P-P-105, Class 2)

*a. Characteristics.* The paper backing is completely covered on one side with hard quartz, quartzite, or flint grit, bonded to the back with animal gelatin adhesive. One assortment, which consists of thirty  $4\frac{3}{8} \times 5\frac{1}{4}$ -inch sheets, includes both fine and medium grit. The other assortment, which consists of twenty  $4\frac{1}{2} \times 5$ -inch sheets, ranges from extra fine to extra coarse grits.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-4-5350-S01.

*c. Uses.*

- (1) It is used for smoothing wood surfaces preparatory to varnishing, lacquering, or painting.
- (2) It is used for cleaning and smoothing commutators of motors and generators.
- (3) It is used for rubbing down undercoats of paint and varnish in preparation for a subsequent coat.
- (4) It is used for rubbing down old coats of paint preparatory to repainting. The finer grains are used when the painted surface is in fair condition and needs cleaning and smoothing only, before a fresh coating is applied. The coarser grains are used when the old paint is in bad condition and must be removed.

## 118. Buffing Compound: Tripoli, Metal Polish

*a. Characteristics.* This is a mild abrasive composed of dustlike silica, compressed into cake form. It will not scratch the metal on which it is used.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Uses.*

- (1) It is used in watch repairing for buffing and polishing and general buffing applications.
- (2) It is used to charge buffing wheel when removing rust or corrosion from highly polished surfaces.

## 119. Cloth, Abrasive: Aluminum Oxide, Cloth-Backing, Closed-Coat (P-C-451a, Type I, Class 1 or 2)

*a. Characteristics.* The cloth backing, which is either jean or drill cloth, is completely covered on one side with aluminum oxide grit, bonded to the cloth with animal gelatin adhesive. It is available in sheets (Class 1) or rolls (Class 2) in various grit sizes.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Uses.*

- (1) Grade 2/0 cloth and finer grades are used for removing rust and for cleaning and polishing iron and steel surfaces in ordinary machine operations. Properly qualified personnel may use grades as coarse as 2/0 for removing burs from threads of breechblocks and breech recesses, gas-check split rings, gas-check seats, steel shanks of sight mountings, bearing sleeves of range finders, and battery commanders' telescope tripods. No abrasive cloth coarser than grade 2/0 is permitted for work on breech mechanisms. Crocus cloth must be used for this purpose.
- (2) Grade 1/0 cloth and coarser are used, generally, for removing rust, burs, and other surface defects from unfinished iron and steel surfaces and for preparing such surfaces for paint finishes. These coarse sizes must never be used on highly finished surfaces.

**Caution:** Aluminum oxide cloth must not be used for abrading or finishing soft bearing metals, such as babbitt metal or brass. Aluminum oxide cloth must not be used to polish commutators of generators and motors, because dislodged grains could lodge under the brushes where they would cut deep scratches in the soft copper commutators and would also ruin the brushes.

## 120. Cloth, Abrasive: Crocus, Ferric Oxide and Quartz, Jean-Cloth-Backing, Closed-Coat (P-C-458a)

*a. Characteristics.* This is a mild abrasive composed of fine, soft, red or reddish-brown tripoli or iron-oxide powder, cemented onto cotton drill or jean cloth.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Use.* It is used for cleaning and polishing finely finished surfaces of rifle parts, breechblocks, gun slides, and optical coating equipment. Organizational maintenance personnel must use nothing coarser than crocus cloth for removing rust stains from highly finished surfaces.

## 121. Cloth, Abrasive: Silicon Carbide, Cloth-Backing, Closed-Coat (P-C-451a, Type II, Class 1)

*a. Characteristics.* The cloth backing, which is drill cloth for grit number 60 or coarser and jean cloth for grit number 80 or finer, is completely covered on one side with silicon-carbide grit, which is bonded to the backing with animal gelatin adhesive. The abrasive cloth is available in sheets (Class 1) in various grit numbers.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Use.* It is used for grinding and polishing low-tensile-strength metals, such as aluminum, copper, magnesium, and bronze.

## 122. Grain Abrasive: Aluminum Oxide

*a. Characteristics.* Aluminum oxide is a very hard, synthetic abrasive. It is available in grit number 800 (very fine) and various coarser grits.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Uses.*

- (1) The very fine grit is mixed with oil and used as a polishing medium for optical equipment.
- (2) The coarser grades are used for lapping and polishing operations on steel parts.
- (3) Aluminum oxide is used extensively in abrasive blasting equipment to clean sand, rust, scale, and foreign matter from cast, forged, and stamped metal parts and to remove old finishes from vehicles.

**123. Grain, Abrasive: Aluminum oxide (Synthetic) 3 Micron Grain Size**

*a. Characteristics.* This is a very fine powdered form of aluminum oxide.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Use.* It is used for lapping and polishing of staking-tool die plates, punches, stumps, and chucks used in watch repairing.

**124. Grain, Abrasive: Garnet, Spark Plug (MIL-C-774B, Type II)**

*a. Characteristics.* This is a graded quartzite, garnet, or other abrasive material resembling sand with most of the fine dust eliminated. Its hardness and abrasiveness are controlled, so as to prevent excessive cutting of the sparkplug insulation during the cleaning operation.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Uses.*

- (1) It is used for cleaning sparkplugs in airblast sparkplug cleaning equipment (TB ORD 313).
- (2) It is used for cleaning aircraft sparkplugs.

**125. Grain, Abrasive: Silicon Carbide (Synthetic)**

*a. Characteristics.* This is a very hard, sharp-grained, synthetic abrasive. It is available in various grit numbers.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Uses.*

- (1) It is used for machine-grinding the edges of glass and other nonmetallic items.
- (2) It is used in the maintenance of anti-aircraft fire control systems.

**126. Grain, Abrasive: Tripoli, Double Ground, 95.37% through 200 Mesh**

*a. Characteristics.* This abrasive is derived from the decomposition of silicious limestone. It is double ground into a very fine powder.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Use.* It is used for polishing metals and for abrading soft metals, such as German silver and white metals.

**127. Lapping and Grinding Compound: Aluminum Oxide, Grease-Mixed**

*a. Characteristics.* This compound is composed of aluminum oxide grit number 120 in a grease vehicle.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Use.* It is used for valve grinding.

**128. Lapping and Grinding Compound. Grease or Water (SS-C-614)**

*a. Characteristics.* This compound is composed of abrasives in oil and grease (type I) or water vehicles (type II). The abrasives are aluminum oxide or silicon carbide, or a mixture of the two. The grease-mixed type is a mixture of a good grade of cup grease or mineral oil with lard oil that will not run too freely under use and is free from objectionable odors. The vehicle of the water-mixed type is water and starch in a soft paste form. A preservative is added for the prevention of mold formation or fermentation when in storage or excessive drying when exposed to air.

**Caution:** The water-mixed compound (type II) must be protected from freezing.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Uses.*

- (1) Compounds with grit numbers 120, 150, and 280 are used for valve grinding.



- (2) Compounds with grit numbers 400 and 600 are used for finish lapping.

### **129. Lapping and Grinding Compound: Silicon Carbide, Water-Mixed**

*a. Characteristics.* This compound is composed of silicon carbide grit number 600 in a vehicle of water and starch in a soft paste form. A preservative is added for the prevention of mold formation or fermentation when in storage and excessive drying when exposed to the air.

*Caution:* It must be protected from freezing.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Use.* It is used for finish lapping.

### **130. Paper, Abrasive: Emery, Paper-Backing, Closed-Coat**

*a. Characteristics.* This abrasive paper consists of emery grains bonded to a 30-pound paper backing, so that one side of the paper backing is completely covered (closed-coat).

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Uses.*

- (1) It is used to featheredge old paint film when spot painting.
- (2) It is used for the fine polishing of metal surfaces.

### **131. Paper, Abrasive: Flint (P-P-105)**

*a. Characteristics.* This abrasive paper consists of hard quartz, quartzite, or flint bonded to a backing of rope, wood-fiber, or kraft paper with animal gelatin adhesive. The abrasive grains in the closed-coat type (class 2 and class 3) cover the entire surface of the backing. In the open-coat finishing (class 1), the abrasive is so spaced that approximately 50 percent of the backing is covered with abrasive. Class 1 abrasive paper is available in sheets of various sizes in grade from 5/0 extra fine to 1/2 coarse. Class 2 abrasive paper is available in sheets of various sizes in grits from 220 and 180 (extra fine) to 36 and 30 (extra coarse). Class 3 abrasive paper is available in a 1-inch-wide roll in fine grade or 24-in-wide roll in coarse grade.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Uses.*

- (1) It is used for smoothing wood surfaces preparatory to varnishing, lacquering, or painting.
- (2) It is used for cleaning and smoothing commutators of motors and generators.
- (3) It is used for rubbing down undercoats of paints preparatory to repainting. The finer grades are used when painted surfaces are in fair condition and need cleaning and smoothing only, before a fresh coating is applied. The coarser grains are used when the old paint is in bad condition and must be removed.

### **132. Paper, Abrasive: Garnet, Rope- or Wood-Fiber-Paper-Backing (P-P-121a)**

*a. Characteristics.* This abrasive paper is composed of clean, hard, fast-cutting garnet grit bonded to one side of a good quality rope- or wood-fiber paper with an animal gelatin adhesive. The abrasive in the closed-coat type (class 2) completely covers one side of the backing. In the open-coat type (class 1), the abrasive particles are spaced so that approximately 50 percent of the backing is covered. The abrasive paper is available in sheets in several grit numbers.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Uses.*

- (1) It is used for sanding by hand on finishing materials.
- (2) It is used for hand sanding on wood, metal, or other surfaces where greater pressures are used for stock removal.

### **133. Paper, Abrasive: Silicon Carbide, Closed-Coat Waterproof (P-P-101a)**

*a. Characteristics.* This abrasive paper is composed of silicon carbide grains bonded to a waterproof paper backing with a waterproof oleoresinous adhesive. The paper is marked "A" (40-lb), "C" (70-lb), and "D" (90-lb), which designates the weight of the paper backing. The abrasive paper is available in sheets of various grit sizes.

b. *Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

c. *Uses.*

- (1) "A" weight paper backing is used for sanding by hand on finishing materials, where wet-sanding is required.
- (2) "C" and "D" weight paper backing is used for hand sanding on wood or metal or other surfaces where greater pressures are used for stock removal, and where wet-sanding is required.

**134. Polishing Abrasive, Optical Glass: Rare-Earth Oxide (MIL-P-3237, Size B)**

a. *Characteristics.* This is a uniform fine-grained dry powder consisting of oxides of rare-earth elements. The powder is to be mixed with distilled water.

b. *Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

c. *Use.* It is used to clean and polish optical glass and to remove leach stains from optical elements.

**135. Pumice, Technical: Abrasive, Ground (SS-P-821)**

a. *Characteristics.* This is a fine, gray, natural abrasive ground into powder form. It is available in powder form in grades FFFF (fine) and FFF (fine) or in cake form 4 x 4 x 8 inches, in grade 1/0 to 1/2.

**Caution:** Pumice will mar optical glass and under no circumstances should it be used on optical components.

b. *Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

c. *Use.* The powder form is used for polishing metal, plastic, hard rubber parts, and for finishing glass, mirrors, and furniture.

**136. Rouge, Abrasive: Polishing, General Use, Molded (Hard)**

a. *Characteristics.* This abrasive is a high-grade, brick-red, molded bar composed principally of ferric oxide.

b. *Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

c. *Use.* It is used for polishing surfaces of gold, platinum, silver, brass, and corrosion-resisting steel.

**137. Rouge, Abrasive: Polishing, Jewelers, Powder or Stick**

a. *Characteristics.* This abrasive is a fine grade of ferric oxide in either stick or powder form.

b. *Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

c. *Use.* It is used for polishing gold and silver.

**138. Sand, Lithographic Graining: Aluminum-Oxide**

a. *Characteristics.* This sand is aluminum-oxide. It provides a grain of medium depth on lithographic plates. This sand is available in various grit numbers.

b. *Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

c. *Use.* It is used for graining lithographic plates used for half-tones, other fine-screen illustrations, posters, and other coarse-screen illustrations.

**139. Steel Wool (FF-W-556)**

a. *Characteristics.* This abrasive is composed of many long-fibered strands of steel having sharp smooth-cutting edges. It is free from chips, short ends, and materials other than steel fibers. It is available in grades 00, 0, 1, and 3.

b. *Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

c. *Uses.*

- (1) *Grade 00.* It is used for preparation of surfaces for the third coat of varnish, shellac, or paint.
- (2) *Grade 0.* It is used for preparation of surfaces for the second coat of varnish, shellac, or paint.
- (3) *Grade 1.* It is used for preparation of surfaces for the first coat or fillers, also for polishing metals and galley equipment.
- (4) *Grade 3.* It is used for removing paint and rust under conditions requiring the use of a coarser grade of steel wool.
- (5) *All Grades.* Steel wool when degreased can be used to reduce free acid and increase ferrous-iron content of zinc-base phosphatizing solutions by processing the wool in the phosphatizing bath (TM 9-1861).

### Section III. CHARACTERISTICS, SUPPLY DATA, AND USE OF ABRASIVE BANDS, BELTS, AND DISKS

#### 140. Band, Abrasive: Aluminum Oxide, Drill-Cloth-Waterproof-Back, Closed-Coat (P-B-172, Type II, Class 4, Style C, Composition 1)

*a. Characteristics.* This band (sleeve) consists of two layers of drill cloth, i. e., an outer layer of waterproof drill cloth, one side of which is completely covered (closed-coat) with aluminum oxide, and an inner layer of plain drill cloth. Both layers are spirally wound, and the butted ends positioned so that they are not superimposed. The two layers are joined together by a waterproof adhesive. These bands (sleeves) are available in different sizes and in various grits.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5345. It is listed in SM 9-1-5345.

*c. Use.* These bands are used on horizontal or vertical spindles of spindle sanders to finish internal curved surfaces, such as bores and brake drums, and for similar operations.

#### 141. Belt, Abrasive: Aluminum Oxide, Cloth-Backing, Closed-Coat (P-B-172, Type I, Class 1, Style A, Composition 1)

*a. Characteristics.* The belt consists of aluminum oxide grit completely covering one side (closed-coat) of a jean- or drill-cloth backing. The grit is bonded to the backing with an animal gelatin adhesive. Abrasive belts with jean-cloth backing are available in only three grits, while the belts with drill-cloth backing are available in numerous sizes and grit numbers.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5345. It is listed in SM 9-1-5345.

*c. Uses.*

- (1) It is used on belt sanding machines for finishing wood products.
- (2) It is used for abrading high-tensile-strength materials, such as alloy steels, annealed malleable iron, and tough bronze.

#### 142. Belt, Abrasive: Garnet, Cloth-Backing, Closed-Coat (P-B-172, Type I, Class 1, Style B, Composition 4 or 5)

*a. Characteristics.* This abrasive belt is made

of hard garnet grit which completely covers one side of a jean-cloth backing (Composition 4) or drill-cloth-backing (Composition 5). The grit is bonded to the backing with an animal gelatin adhesive. The belts are available in various sizes and grit numbers.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5345. It is listed in SM 9-1-5345.

*c. Use.* It is used on a belt-type sanding machine for wood finishing.

#### 143. Belt, Abrasive: Silicon Carbide, Drill-Cloth-Waterproof-Backing, Closed-Coat (P-B-172, Type 1, Class 4, Style C, Composition 3)

*a. Characteristics.* The belt consists of a drill-cloth-waterproof-backing completely covered on one side (closed-coat) with a silicon carbide grit. The grit is cemented to the backing with a waterproof adhesive. The belt is available in one size and in several grit numbers.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5345. It is listed in SM 9-1-5345.

*c. Use.* This type of belt is used for abrading low-tensile-strength materials, such as cast iron, bronze, aluminum, and nonmetallic materials. The waterproof backing and adhesive enable these belts to be used at high speed under a cooling stream of water.

#### 144. Disk, Abrasive: Aluminum Oxide, Closed- or Open-Coat (MIL-D-15770C, Type I, Class 1 or 2)

*a. Characteristics.* These disks are composed of aluminum oxide grit bonded to a vulcanized fiber back or a combination of vulcanized fiber and drill-cloth-backing. Class 1 disks are completely covered on one side by the grit (closed-coat) and Class 2 disks have approximately 50 percent of one side covered with grit (open-coat). An animal gelatin adhesive is used to cement the grit to the backing and the fiber paper to the cloth. The disks are without slots and are available in various sizes and grits.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5345. It is listed in SM 9-1-5345.

*c. Uses.*

- (1) Class 1 disks are used for general conditioning or grinding of metals of high-tensile-strength metals, such as malleable iron, carbon steels, and alloy steels.
- (2) Class 2 disks are for the removal of heavy concentrations of rust and old coats of paint from metal surfaces.
- (3) Class 1 and 2 will give better results, if the angle between the disk and the working surface does not exceed 9 degrees.

**145. Disk, Abrasive: Garnet,  
Drill-Cloth-Backing, Closed-Coat**

*a. Characteristics.* These disks have either a drill-cloth-backing or paper backing which is completely covered (closed-coat) on one side with hard, fast-cutting garnet grit. These grits are bonded to the backing with an animal adhesive. Disks having a cloth-backing are 10 inches in diameter, with a 1/2-inch arbor hole, available in several grit sizes. Disks having a

diameter of 12 or 16 inches do not have an arbor hole. This type of disk is cemented to the pad of the sanding machine.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5345. It is listed in SM 9-1-5345.

*c. Uses.*

- (1) The coarser grits are used for rough finishing and removing tool marks from wood products.
- (2) The finer grits are used for final finishing of wood products.

**146. Disk, Abrasive: Silicon Carbide,  
Drill-Cloth-Backing, Open-Coat**

*a. Characteristics.* These disks are composed of a drill-cloth backing, with silicon carbide grit covering about 50 percent of one side. The space between the grit allows the abraded material to fall free. These disks are available in various sizes and grit numbers.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5345. It is listed in SM 9-1-5345.

*c. Use.* These disks are used on a brake-lining grinding machine.

## CHAPTER 5

### ADHESIVE MATERIALS

---

#### Section I. GENERAL

##### 147. Scope

Adhesives are used to bond surfaces of various types of materials together. Adhesive is a general term which includes cements, glues, mucilage, and pastes. Adhesives in this chapter have specific use or general usage in Ordnance. These adhesives are the most commonly used. They are listed alphabetically by use. These adhesives do not include packaging adhesives. The packaging adhesives may be found in TM 9-209.

##### 148. Procedures

The instructions for mixing the adhesive, where applicable, are furnished by the manufacturer. Methods of application will be found in the pertinent technical publication.

##### 149. Precautions

The precautionary notes that are found in some of the following paragraphs indicate the dangers to the operator and fire hazards and the preventive measures to be taken to safeguard personnel and to protect equipment and materials.

#### Section II. CHARACTERISTICS, SUPPLY DATA, AND USE OF ADHESIVE MATERIALS

##### 150. Adhesive: Abrasive Disk, Liquid, Rubber

*a. Characteristics.* This is a clear, light-body adhesive, having a base material of reclaimed rubber.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used to bond cloth or paper-backed abrasive disks to the rotating pad of a motor-driven sanding machine.

**Warning:** This is a flammable material. Keep away from sparks and open flame.

##### 151. Adhesive: Canvas, Liquid, Rubber (MIL-C-2399)

*a. Characteristics.* This is a fast-drying synthetic-base adhesive. It is resistant to oil, fuel, and water. It air dries at normal temperatures leaving a flexible waterproof film. It can be applied at temperatures as low as minus 10° F.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used for patching canvas material, such as tarpaulins, tents, and protective covers.

**Warning:** This is an extremely flammable material. Keep away from heat, sparks, and open flame. Use with adequate ventilation. Avoid repeated or prolonged breathing of the vapors or contact with skin.

##### 152. Adhesive: Floor Covering, Paste, Rubber (MIL-C-15200)

*a. Characteristics.* This is a black, fast-drying adhesive in paste form. The base material is reclaimed rubber.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used to secure linoleum to steel, concrete, and wooden surfaces.

**Warning:** This is an extremely flammable material, having a flash point lower than 0° F. No source of spark or flame should be allowed in area during use or until fume concentration reaches a safe level. Use adequate ventilation.

##### 153. Adhesive: Fording Kit, Paste, Rubber

*a. Characteristics.* This is a natural-rubber-base adhesive in paste form.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used in connection with deep-water fording kits for artillery.

**Warning:** This is a flammable material. Keep away from sparks and open flame.

#### **154. Adhesive: Glass Cloth, Liquid, Resin**

*a. Characteristics.* This is a pale amber-colored, low-viscosity resin-epoxy in liquid form. The catalyst is a high-viscosity liquid. It is mixed with the epoxy resin immediately before use.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used in repairing the radome of fire control system M33.

**Warning:** Avoid contact of skin with this adhesive. In case of contact with the resin or catalyst, wash area with denatured alcohol, then with soap and water. Use with adequate ventilation.

#### **155. Adhesive: Liquid, Rubber**

*a. Characteristics.* This is a black, synthetic-rubber-base adhesive. It is resistant to heat, cold, water, gasolines, and oil.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used for bonding wood, felt, cork, fabric, leather, synthetic rubbers to themselves and to metal.

**Warning:** This is a flammable material. Keep away from sparks and open flame.

#### **156. Adhesive: Liquid, Rubber (MIL-C-4003)**

*a. Characteristics.* This is a general-purpose, fast-drying adhesive. It has a rubber base and is resistant to gasoline and oil.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used to bond rubber, vinyl, steel, aluminum, leather, cloth, etc.

**Warning:** This is an extremely flammable adhesive. It has a flash point of 2° F. Keep away from heat, sparks, and open flame. Avoid prolonged breathing of vapors and repeated or prolonged contact with skin. Use with adequate ventilation.

#### **157. Adhesive: Liquid, Rubber (MIL-A-5092, Type I)**

*a. Characteristics.* This is a reclaimed-rubber-base adhesive. This adhesive, upon evaporation of the solvent, leaves a flexible film having tackiness, strength, stretch, and adhesion properties. The adhesive will not resist oil or fuel and has a poorer resistance to water than types II and III of this specification.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Uses.*

- (1) It is used for general purposes where the unit stress on the adhesive is not appreciable.
- (2) It is used for bonding duck, leather, felt, cork, and similar materials to each other or in combination. It will also bond these materials to aluminum alloy, steel, laminates, and wood.

**Caution:** The adhesive may settle in the container. Before use, it should be remixed by stirring when packaged in a can or by kneading when packaged in a tube.

**Warning:** This is a flammable material. Keep away from sparks and open flame. Under no circumstances will this adhesive be used for structural purposes, such as for liferafts, airships, or for de-icer-boot manufacture or repair.

#### **158. Adhesive: Liquid, Rubber (MIL-A-5092, Type II)**

*a. Characteristics.* The base material of this adhesive is neoprene. The adhesive will resist oil but not fuel, has excellent water resistance, adheres to natural rubber, and is effective for bonding synthetics. This adhesive usually cannot be thinned. It will gel if subjected to prolonged storage.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Uses.*

- (1) It is used where applications require an oil-resistant adhesive where the unit stress on the adhesive is not appreciable.

- (2) It is used to cement optical prisms to opposite faces of an aluminum shelf for use in fire control instruments.
- (3) It is used for bonding duck, leather, felt, cork, and similar materials to each other or in combination. It will also bond these materials to aluminum alloy, steel, laminates, and wood.

**Warning:** This is a flammable material. Keep away from sparks and open flame. Under no circumstances will this adhesive be used for structural purposes, such as for liferafts, airships, or for de-icer-boot manufacture or repair.

#### 159. Adhesive: Liquid, Rubber (MIL-A-5092, Type III)

*a. Characteristics.* The base material of this adhesive is Buna-N synthetic rubber. The adhesive will resist both oil and fuel and has excellent water resistance. It adheres satisfactorily to synthetic rubber but has poor adhesion to natural rubber.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Uses.*

- (1) It is used where applications require an aromatic-fuel-resistant adhesive where the unit stress on the adhesive is not appreciable.
- (2) It is used for bonding duck, leather, felt, cork, and similar materials to each other or in combination. It will also bond these materials to aluminum alloy, steel, laminates, and wood.
- (3) It is used for bonding vinyl plastics.

**Warning:** This is a flammable material. Keep away from sparks and open flame. Under no circumstances will this adhesive be used for structural purposes, such as for liferafts, airships, or for de-icer-boot manufacture or repair.

#### 160. Adhesive: Liquid, Rubber (MIL-A-13883, Type I)

*a. Characteristics.* This is a general-purpose, synthetic-rubber-base, thermoplastic adhesive. Class 1 has a high solid content and Class 2 has a low solid content.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Uses.*

- (1) It is a general-purpose adhesive, used in applications where it will not be subjected to either continuous high stresses or stresses at elevated temperatures.
- (2) It will bond metal, wood, plastic, fabric, ceramics, glass, rubber, paper, and leather to themselves and to each other.

**Warning:** This is a flammable material. Keep away from sparks and open flame.

#### 161. Adhesive: Liquid, Rubber (MIL-C-2749)

*a. Characteristics.* This is a black, waterproof adhesive, having a reclaimed-rubber base. When dry, it produces a bond which is firm and tough, yet flexible and rubbery.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used for sealing glass within frames in automotive equipment.

**Warning:** This is an extremely flammable adhesive. It has a flash point of minus 6° F. Keep away from heat, open flame, and sparks. Avoid repeated or prolonged contact with skin or breathing of vapors. Use with adequate ventilation.

#### 162. Adhesive: Neoprene, Liquid, Rubber

*a. Characteristics.* This is an amber-colored, transparent, neoprene-base adhesive. It is fuel, oil, and water resistant.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used to bond neoprene to neoprene, wood, metal, or other materials.

#### 163. Adhesive: Paper (Artist and Photographer) Liquid (ZZ-C-191, Type I)

*a. Characteristics.* This adhesive is composed of pale crepe rubber in a suitable solvent.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Uses.*

- (1) It is used by artists and photographers for mounting purposes.

- (2) It is used in offices for paper pasting purposes.

**Warning:** This is a flammable material. Keep away from sparks and open flame.

**164. Adhesive: Paper, Liquid (MMM-M-792, Type III)**

*a. Characteristics.* This is a quick-setting paper adhesive. It does not have an objectionable odor. It contains a preservative to prevent mold growth.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is a paper adhesive for office use.

**165. Adhesive: Rubber Materials, Liquid, Rubber (MIL-C-897)**

*a. Characteristics.* This is a synthetic-rubber-base or reclaimed-rubber-base adhesive in liquid form.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used to bond synthetic rubber to synthetic rubber.

**Warning:** This is a flammable material. Keep away from sparks and open flame. Do not use to repair rubber boats or lifesaving equipment.

**166. Adhesive: Tires and Tubes, Liquid, Rubber (ZZ-C-191, Type II)**

*a. Characteristics.* This adhesive is composed of natural rubber dissolved in a solvent. It may also contain a small quantity of resin.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used for quick repair of inner tubes.

**Caution:** It must be protected from freezing.

**Warning:** This is a flammable material. Keep away from sparks and open flame.

**167. Adhesive: Tires and Tubes, Liquid, Rubber (ZZ-T-416, Type IV, Class A)**

*a. Characteristics.* This adhesive is composed of not less than one-half pound of natural rubber per gallon, with no reclaimed rubber, and with a volatile petroleum solvent. After being applied, it is cured by vulcanization.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used in recapping, repairing, and retreading tires, also in sectional tire repairs and inner tube repairs.

**Warning:** This is a flammable material. Keep away from sparks and open flame.

**168. Adhesive: Tires and Tubes, Liquid, Rubber (ZZ-T-416, Type IV, Class B)**

*a. Characteristics.* This adhesive is composed of natural rubber in a petroleum solvent. The solution shall not contain reclaimed rubber. The solvent will evaporate with no oily residue.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used in conjunction with style 1 combination-tube-repair gum for cold-process repair and reconditioning of inner tubes.

**Warning:** This is a flammable material. Keep away from sparks and open flame.

**169. Adhesive: Watch Crystal, Liquid, Synthetic-Resin**

*a. Characteristics.* This is a clear, air-drying, synthetic-resin-base (butyl methacrylate) adhesive.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used for cementing unbreakable watch crystals.

**Warning:** This is a flammable material. Keep away from sparks and open flame.



## CHAPTER 6

### SEALING MATERIALS

---

#### Section I. GENERAL

##### 170. Scope

Sealing materials are used to fill voids, cracks, or joints to exclude moisture, water, and foreign matter. The sealing compounds in this chapter are listed alphabetically by use. This chapter does not include sealing compounds used in packaging. Those compounds may be found

in TM 9-209.

##### 171. Procedures

The instructions for mixing the sealing compound, where applicable, are furnished by the manufacturer. Methods of application will be found in the pertinent technical publications.

#### Section II. CHARACTERISTICS, SUPPLY DATA, AND USE OF SEALING MATERIALS

##### 172. Sealing Compound: Automotive, Semisolid, Rubber (MIL-S-3802)

*a. Characteristics.* This is a paste-type, flexible, quick-drying, sealing compound. It is highly resistant to oil, and insoluble in water.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is applied between the metal sealing plate and the axle of automotive equipment.

##### 173. Sealing Compound: Electric Wires and Cables, Semisolid

*a. Characteristics.* This is a pliable, plastic compound that permits expansion and contraction of cables without weakening its sealing properties. It will not slump under temperatures up to 125° F. and remains workable and plastic at 0° F. It is not affected by the water, gases, or condensates usually encountered underground.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is used for sealing around electrical cables and wires.

##### 174. Sealing Compound: Fire Control Instruments, Semisolid, Rubber (MIL-S-11030, Type II)

*a. Characteristics.* This is a stable, homo-

geneous, noncorrosive, nontoxic compound. This compound is not required to be resistant to oil or heat.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is used for rotary sealing, by injection, of metal to metal in optical instruments.

##### 175. Sealing Compound: Fire Control Instruments, Liquid, Rubber, w/Premeasured Accelerator (MIL-S-11031)

*a. Characteristics.* This is a two-part material consisting of a black polysulfide-base compound and a catalyst. The compound and catalyst are contained in separate cans in the same box and are mixed according to manufacturer's instructions. The compound is water and oil resistant and will not crack or flake when subjected to flexing at minus 40° F.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Uses.*

(1) It is used for bonding metal-to-metal or glass-to-glass in optical instruments.

(2) It is used for sealing setscrews in instruments.

**Warning:** The catalyst used contains lead compounds. Avoid excessive contact with skin. Wash hands before eating or smoking.

#### **176. Sealing Compound: Fire Control Instruments, Semisolid (FXS 780)**

*a. Characteristics.* This is a homogeneous, stable, noncorrosive compound, of semiliquid consistency. It has a minimum softening point of 170° F. and will not crack or flake when exposed to a temperature of minus 60° F.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is used for sealing metal-to-metal joints in ordnance height finders and other fire control instruments.

#### **177. Sealing Compound: Fire Control Instruments, Semisolid, Rubber (MIL-S-11030, Type I, Class 1)**

*a. Characteristics.* This is a homogeneous, stable, noncorrosive, nontoxic compound. It is an inert, thermoplastic, noncuring compound. It is not affected by oil or temperatures between minus 65° F. to plus 180° F.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is used for static sealing, by injection, of glass-to-metal in optical instruments.

#### **178. Sealing Compound: Flanged Joints, Liquid Polymer (MIL-S-12158)**

*a. Characteristics.* This is a soft, gray, pliable compound. It will not crack or flake at minus 65° F. nor flow at ambient temperatures of 225° F.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is used for sealing the flanged joints on tank hulls.

#### **179. Sealing Compound: Fording Kit, Semisolid, Asbestos (GK)**

*a. Characteristics.* This is a waterproof grease containing asbestos fibers. Its cohesive and adhesive properties are such as to permit it to be spread evenly on dry surfaces, worked into cracks and crevices, and molded around projecting parts.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Uses.*

- (1) It is used as a sealing compound with deep-water-fording kits where excessive heat is not encountered.
- (2) It is used to cover sealing tape when more than a brush or spray coating is desired.
- (3) It is used to fill recesses around spark-plugs in certain truck engines to prevent accumulation of water during storage.

#### **180. Sealing Compound: Insulating, Semisolid Plastic**

*a. Characteristics.* This is a dark-brown, non-toxic, nonflammable compound of puttylike consistency. It will not harden or oxidize. It is resistant to both fresh and salt water and will adhere to metallic and nonmetallic surfaces.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5970. It is the responsibility of Raritan Arsenal.

*c. Use.* It is used as a protective, insulating coating on sparkplug porcelain and components of high-tension wiring systems of vehicles for amphibious operations.

#### **181. Sealing Compound: Optical Coating Machines, H<sub>v</sub> Grease, Transparent**

*a. Characteristics.* This is a heavy, transparent grease with a melting point of 265° F.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*Uses.*

- (1) It is used for sealing bell-jar and other components of optical-coating machines.
- (2) It is used for rubber gaskets and metal-to-rubber joints wherein a seal is hard to maintain and where excessive heat is encountered in high-vacuum optical-coating apparatus.

#### **182. Sealing Compound: Remote Control System, Asphalt**

*a. Characteristics.* This is a solid, black, wax-like compound. It is liquefied by heat. Its pour point is 356° F.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is used for filling cable endbells, cable joints, and other uses where a filling compound with high dielectric strength is required on remote control systems.

**183. Sealing Compound: Storage-Battery, Asphalt (MIL-C-2687)**

*a. Characteristics.* This is a black, asphaltic

compound in solid form. It is insoluble in sulfuric acid. It will adhere firmly to the battery without cracking or shrinking at temperatures between 0° and 150°F.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is liquefied by heat and used to seal acid-type storage batteries.

## CHAPTER 7

### CHEMICALS AND OTHER MISCELLANEOUS MATERIALS

---

#### Section I. GENERAL

##### 184. Scope

This chapter includes chemicals used for etching, as indicators, and for other special purposes that are not listed in the chapters on cleaning materials or preservative materials. Also included are items that are used in connection with the materials listed in other chapters of this technical manual.

##### 185. Procedures

The detailed instructions for the use of these

chemicals will be found in the publications referenced in the pertinent paragraph.

##### 186. Precautions

The warnings that are found in some of the paragraphs indicate the extent of first aid which should be given in most instances. They also indicate hazards to personnel using the materials.

#### Section II. CHARACTERISTICS, SUPPLY DATA, AND USE OF CHEMICALS

##### 187. Ammonium Chloride, Technical: Crystalline Form (O-A-491)

*a. Characteristics.* This is an odorless compound with a saline taste. It is issued in two grades: Grade A (99 percent minimum ammonium chloride) and Grade B (95 percent minimum ammonium chloride).

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used as a soldering flux.

##### 188. Bromocresol Green, Reagent

*a. Characteristics.* This is a complex organic compound. An indicator solution prepared from this compound is yellow in acid solution and blue in alkaline solution. Refer to TM 9-208-1.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 6810. It is listed in SM 10-1-6800.

*c. Use.* It is dissolved in alcohol to prepare 1 percent brom cresol green indicator that is used in analysis of phosphatizing solutions.

##### 189. Diethylene Glycol, Technical

*a. Characteristics.* This is a colorless, hygro-

scopic, practically odorless liquid. It is miscible with water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-3-3-2.

*c. Use.* It is used as a component of an anodic treatment solution that is used in type V treatment of magnesium-alloy parts to prepare them for painting.

##### 190. Diphenylbenzidine, Reagent

*a. Characteristics.* This is a compound consisting of white leaflets or plates. It is insoluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810.

*c. Use.* It is used to prepare a 1 percent diphenylbenzidine indicator that is used in determining zinc content in analysis of phosphatizing solutions. Refer to TM 9-208-1.

##### 191. Mercuric Iodide, Red, Analyzed Reagent

*a. Characteristics.* This is a scarlet-red, odorless powder. It is slightly soluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-3-3-2.

*c. Use.* It is used with soluble starch to prepare starch indicator solution in sodium dichromate determination in control of chrome-pickle solution. Refer to MIL-M-3171A.

## 192. Methyl Orange Xylene Cyanole Solution

*a. Characteristics.* This is a solution of methyl orange and xylene cyanole in distilled water. It is ready for use as issued.

*b. Supply Data.* This is a Chemical Corps item in FSC 6820. It is listed in SM 3-1-6800.

*c. Use.* It is used as an indicator for determining free-acid content of phosphatizing solutions.

## 193. Oxalic Acid, Dihydrate, Technical (O-A-91, Type II)

*a. Characteristics.* This compound consists of colorless, odorless crystals or white granules.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used, as a 1- to 5-percent solution in water, to etch ferrous metals before they are phosphatized.

**Warning:** This compound is poisonous.

## 194. Phenolphthalein Solution

*a. Characteristics.* This is a solution consisting of phenolphthalein, pure ethyl alcohol, and distilled water. It contains 1 percent phenolphthalein by weight.

*b. Supply Data.* This is a Chemical Corps item in FSC 6820. It is listed in SM 3-1-6800.

*c. Uses.*

- (1) It is used as an indicator for the determination of free- and total-acid content of phosphatizing solutions. Refer to TM 9-208-1.
- (2) It is used as an indicator for the determination of free-acid content of an acid fluoride solution used for protective treatment of magnesium alloys.
- (3) It is used as an indicator to aid in the determination of solution strength of alkali-type paint remover, classes 1 and 2, TT-R-230.

## 195. Potassium Bifluoride, Technical

*a. Characteristics.* This compound consists of colorless crystals that are soluble in water. It is also known as potassium acid fluoride.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-3-3-2.

*c. Use.* It is used as a component of a chrome-pickle bath for treating magnesium-alloy sand-mold, permanent-mold, and die castings to protect them against corrosion or to form a base for painting. Refer to MIL-M-3171A.

**Warning:** This is a poisonous material.

## 196. Potassium Biphthalate, Reagent

*a. Characteristics.* This compound consists of white, odorless crystals that are soluble in water. It is also known as potassium acid phthalate.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used to prepare one-tenth normal potassium acid phthalate solution that is used to standardize sodium hydroxide solution used in analysis of phosphatizing solutions. Refer to TM 9-208-1.

## 197. Potassium Dichromate, ACS: Crystals

*a. Characteristics.* This compound consists of orange-red crystals that are soluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used to prepare one-tenth normal potassium dichromate solution that is used as a reagent in analysis of phosphatizing solutions. Refer to TM 9-208-1.

## 198. Potassium Ferricyanide, Reagent

*a. Characteristics.* This compound consists of ruby-red crystals which are soluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used to prepare 1 percent potassium ferricyanide solution that is used as an indicator in determining the zinc content of phosphatizing solutions. Refer to TM 9-208-1.

## 199. Potassium Ferrocyanide, Trihydrate, Reagent

*a. Characteristics.* This compound consists of yellow crystals which are soluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used to prepare one-eightieth molar potassium ferrocyanide solution that is used as a reagent in determining the zinc con-

tent of phosphatizing solutions. Refer to TM 9-208-1.

## 200. Potassium Iodide, ACS

*a. Characteristics.* This compound consists of colorless or white crystals or white granules. It is soluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used as a reagent in control of a chrome-pickle bath that is used for treatment of magnesium-alloy parts to protect them against corrosion. Refer to TM 9-208-1.

## 201. Potassium Permanganate, Solution

*a. Characteristics.* This is a violet aqueous solution composed of approximately 6.0 grams of chemically pure potassium permanganate in 1 liter of distilled water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used as a reagent for the determination of the iron content of phosphatizing solutions. Refer to TM 9-208-1.

## 202. Silver Nitrate, ACS

*a. Characteristics.* This is a colorless, odorless compound occurring as large transparent crystals or small white crystals.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used to prepare a 1 percent silver solution which is used in analysis of phosphatizing solutions. Refer to TM 9-208-1.

**Warning:** This is a poisonous and corrosive material. In case of contact with skin or eyes, flush area with water for at least 20 minutes. Get medical attention.

## 203. Sodium Bicarbonate, Technical (O-S-576)

*a. Characteristics.* This is an odorless compound occurring as a white, crystalline powder or granules. It is soluble in water and forms a mildly alkaline solution. It is commonly called baking soda or bicarbonate of soda.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used to neutralize sulfuric acid electrolyte which has spilled on the outside of

storage batteries. It may be used to neutralize the spillage of all acids.

## 204. Sodium Borate, Decahydrate, Technical Powdered

*a. Characteristics.* This is a colorless or white crystalline powder which is soluble in water. It is also called borax. It dissolves many metallic oxides when fused with them.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used as a flux in welding and soldering of metals.

## 205. Sodium Carbonate, Anhydrous, Reagent

*a. Characteristics.* This is a white, odorless powder with an alkaline taste. It is soluble in water. It will absorb water from the air.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Uses.*

(1) It is used as a component of a 1 percent potassium ferricyanide solution and one-eightieth molar potassium ferrocyanide solution used in analysis of phosphatizing solutions. Refer to TM 9-1861.

(2) It may be used as a substitute for item in paragraph 203.

## 206. Sodium Hydroxide, ACS: Pellet form

*a. Characteristics.* This is a highly caustic, crystalline compound. The pellets consist of crystals fused together. It is deliquescent and when dissolved in water generates a large amount of heat. It is comparatively pure and is sometimes referred to as lye, caustic soda, or white caustic.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Uses.*

(1) It is used to decoat lenses and prisms of optical instruments.

(2) It can be used to prepare standard sodium hydroxide solutions for use in determining concentration of acids.

**Caution:** It must be kept in tightly closed containers.

**Warning:** Add pellets to cold water, to avoid violent eruptions. This com-

pound is injurious to the body and will destroy clothing. Alkali burns must be treated immediately by flushing affected area with large quantities of clean, cool water for at least 20 minutes. Get medical attention.

#### **207. Sodium Hydroxide Solution: 0.1 Normal**

*a. Characteristics.* This is a standardized solution of chemically pure sodium hydroxide in distilled water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Uses.*

- (1) It is used as a reagent for the determination of free- and total-acid content of phosphatizing solutions. Refer to TM 9-1861.
- (2) It is used as a reagent to determine nitric acid concentration in control of chrome-pickle solution. Refer to MIL-M-3171A.

#### **208. Sodium Silicate Solution (O-S-605)**

*a. Characteristics.* This is a syrupy and cloudy solution of sodium silicate in water. This solution contains 8.5 to 9.4 percent by weight of sodium oxide.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-1-6800.

*c. Use.* It is used in connection with rebabbiting of automotive bearings and inserts. Refer to ORD 6 SNL J-9, Section 4.

#### **209. Sodium Thiosulfate Solution, Reagent**

*a. Characteristics.* This is a solution of pure sodium thiosulfate in distilled water. This solution is practically neutral.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-3-3-2.

*c. Use.* One-tenth (N/10) sodium thiosulfate solution is used as a reagent in sodium dichromate determination in connection with control of chrome-pickle solution for treatment of magnesium-alloy parts.

#### **210. Starch, Soluble, Reagent Powder**

*a. Characteristics.* This is a white, odorless, tasteless powder that is soluble in water.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 6810. It is listed in SM 10-1-6800.

*c. Use.* It is used to prepare starch indicator solution that is used in sodium dichromate determination in connection with control of chrome-pickle solution for the treatment of magnesium-alloy parts.

#### **211. Zinc Carbonate, Analyzed, Reagent**

*a. Characteristics.* This is a white, odorless powder that is insoluble in water.

*b. Supply Data.* This is a Chemical Corps item in FSC 6810. It is listed in SM 3-3-3-2.

*c. Use.* It is used as a substitute for zinc oxide to prepare a standard zinc solution that is used in analysis of zinc-base phosphatizing solutions.

**Warning:** This is a poisonous compound.

### **Section III. CHARACTERISTICS, SUPPLY DATA, AND USE OF MISCELLANEOUS MATERIALS**

#### **212. Antiseize Compound: Leadpowder and Oil**

*a. Characteristics.* This is a compound containing leadpowder mixed in oil.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is used for threads of bolts, nuts, etc., to prevent seizing and to facilitate subsequent disassembly.

#### **213. Antiseize Compound: Mica-Base (MIL-A-13881)**

*a. Characteristics.* This is a dark green or

amber colored compound containing petroleum and ground mica flakes. It is noncorrosive. It has a flash point of 600° F. minimum. It is a nonconductor of electricity.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is used for threads of bolts, nuts, etc., where high temperatures are involved to prevent seizing and to facilitate disassembly.

**Caution:** This compound, because of its insulating properties, should not be used where mating parts are required to be in good electrical contact.

**214. Antiseize Compound: White Lead-Base, General Purpose (JAN-A-669)**

*a. Characteristics.* This is a homogeneous mixture of white lead, asphalt, graphite, lubricating oil, and petrolatum.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is used for general purposes to prevent seizing and to facilitate subsequent disassembly of mating threaded parts.

**215. Calking Compound (TT-C-598, Grade 2)**

*a. Characteristics.* This is a gray-colored, plastic material. It remains plastic, responding to the contraction and expansion of the joint or opening.

*b. Supply Data.* This is a Corps of Engineers item in FSC 8030. It is listed in SM 5-1-8000.

*c. Uses.*

- (1) It is used for calking openings and seams in equipment being prepared for storage.
- (2) It is used to prepare equipment for deep-water fording.

**216. Canada Balsam: Fire Control Instruments, Oleoresin, Stick Form (MIL-B-3469)**

*a. Characteristics.* This is a yellowish, transparent, noncrystalline material prepared from oleoresin exuded from the balsam fir tree and issued in stick form.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used for cementing glass optical elements in fire control instruments.

**217. Cement, Watch Jewel: Shredded Stick Form**

*a. Characteristics.* This cement consists of brownish threads, 1 inch long, with a diameter equivalent to that of a coarse human hair.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used for sealing pallet and roller jewels of watches.

**218. Compound Paste: Grinder, Aqua-Sol**

*a. Characteristics.* This is a paste that is

mixed with water to form a coolant for electric cam grinders.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5350. It is listed in SM 9-1-5350.

*c. Use.* It is used, when mixed with warm water, as a coolant for grinding and for general purpose electric cam grinders. Refer to TM 9-1834A.

**219. Compound Waterproof**

*a. Characteristics.* This is a black, soft paste with a reclaimed-rubber base. This compound is resistant to intermittent exposure to water or corrosive chemicals and fumes.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is used for the protection of sheet metal parts, blower housings, and any other metal exposed to intermittent water or corrosive chemicals and fumes.

**Warning:** This is a flammable compound. Keep away from heat or open flame. Use with adequate ventilation.

**220. Crayon, Marking: White, Soapstone, Rectangular (SS-C-661)**

*a. Characteristics.* These crayons are in stick form. They are approximately 5 inches long.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7510. It is listed in SM 10-1-7500.

*c. Use.* It is used to mark hot or cold metal.

**221. Filler Compound, Brake Lining**

*a. Characteristics.* This is a quick-drying compound for application between brake shoe and lining to fill up airspace.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8030. It is listed in SM 9-1-8000.

*c. Use.* It is used to provide a better bond and to fill irregularities between brakeshoes and linings in order to deaden vibrations, eliminate squeals, and prevent "spongy" brake-pedal action.

**222. Filler, Wood, Plastic: Natural (TT-F-340)**

*a. Characteristics.* This is a light-colored, nontoxic, water-resistant compound. It sets quickly and hardens sufficiently in 4 hours to



withstand ordinary handling and use of the article to which it is applied.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8010. It is listed in SM 9-1-8000.

*c. Uses.*

- (1) It is used for sealing over countersunk screw heads.
- (2) It is used for filling in undesirable holes and cracks or building up parts of wooden patterns or joiner work.

**223. Gasket Cement: (MIL-C-10523)**

*a. Characteristics.* This is a nondrying, plastic, heat-resisting, semifluid adhesive.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Uses.*

- (1) It is used for assembling fuel-line connections, particularly pipe fittings at fuel pumps and carburetors.
- (2) It is used for metal-to-metal joints.
- (3) It is used on uncoated gaskets on certain types of materiel as specified in the manual for that type of equipment.
- (4) It is used as specified for installation of items in winterization kits.

*Note.* It is not to be used as a substitute for antiseize compound.

**224. Gasket Forming Compound:**

*a. Characteristics.* This is a slow-drying, non-hardening, plastic, gasket-sealing compound. It is fuel, oil, and water resistant.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5330. It is listed in SM 9-1-5330.

*c. Use.* It is used for coating gaskets of engine accessories, gear housings, flanges, etc., where high temperatures are encountered.

**225. Graphite, Dry: Natural or Synthetic, Powder (MIL-G-6711)**

*a. Characteristics.* This is an allotropic form of carbon having a silvery-black luster. It is free from coal, carbon black, and abrasives.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 9620. It is listed in SM 10-1-9500-9600.

*c. Uses.*

- (1) It is used for lubricating tumblers in

automotive ignition switches and door locks that are exposed to the elements, especially in freezing temperatures.

- (2) It is used for coating rims of wheels before mounting tires.

**226. Insulating Compound, Electrical: Liquid, Porcelain Cement**

*a. Characteristics.* This is a viscous, paste-like material which dries to a hard white substance.

*b. Supply Data.* This is a Raritan Arsenal item of supply in FSC 5970.

*c. Use.* It is used for cementing porcelain insulators.

**227. Insulating Compound, Electrical: Paste (MIL-I-8660)**

*a. Characteristics.* This is a heavy-bodied, translucent, light-grey- or cream-colored compound containing silicone oils. It is nontoxic and noncorrosive and is effective in temperatures ranging from minus 65° to plus 400° F. It may be pigmented or dyed when so specified.

*b. Supply Data.* This is an Ordnance Corps item in FSC 8040. It is listed in SM 9-1-8000.

*c. Use.* It is used for sealing high-tension electrical connections of aircraft and automotive engines and in sealing and insulating electronic equipment, subassemblies, and components where it is essential that moisture and air be excluded and the material remain soft to permit easy disassembly or change.

**Warning:** Contact of this compound with eyes may prove irritating.

**228. Litmus Paper: Strip Form, 2 Inches Long x 1/4 Inch Wide**

*a. Characteristics.* These strips are red or blue, unsized and impregnated with litmus. Blue litmus paper changes to red if the liquid is an acid. Red litmus paper changes to blue if the liquid is an alkaline.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 6640. It is listed in SM 10-1-6600.

*c. Use.* It is used to indicate whether a liquid is an acid or an alkaline. It does not indicate the degree of acidity or alkalinity.

## 229. Masking Paste (TT-P-181)

*a. Characteristics.* This is a white, smooth, noncorrosive, soft paste. It is free from gritty material, objectionable odors, and toxicity. It is removable by washing with water.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 8030. It is listed in SM 10-1-7900, 8000.

*c. Use.* It is used to prevent the adhesion of paints, enamels, and lacquers to glass, plastic, and other surfaces adjacent to areas that are being coated with these finishes.

**Caution:** When the paste is washed off, it should not be allowed to come in contact with freshly painted surfaces, since the paste contains glycerin that might damage the paint.

## 230. Pigment, Iron Blue: In Oil (TT-P-381)

*a. Characteristics.* This is a dry, iron-blue pigment in linseed oil and a small amount of volatile thinner, in semifluid consistency. It is susceptible to the action of alkali.

*b. Supply Data.* This is a Corps of Engineers item in FSC 8010. It is listed in SM 5-1-8000.

*c. Use.* It is used to indicate high spots when adjusting or fitting bearing surfaces.

## 231. Plaster Gypsum: Neat Type (MIL-G-0020098)

*a. Characteristics.* This is a fine white powder that when mixed with water to a paste consistency quickly sets to a hard mass. It is commonly called plaster of Paris.

*b. Supply Data.* This is an Ordnance Corps item in FSC 5610. It is listed in SM 9-1-5600.

*c. Use.* It is used for setting leveling vials in fire control equipment and other instruments.

## 232. Putty: Linseed Oil, White Lead (TT-P-791)

*a. Characteristics.* This is a mixture of white lead, true chalk whiting, pure linseed oil, and drier. It can be worked with the hands into a soft plastic mass which is not sticky. After it is applied, it will hold its shape and set.

*b. Supply Data.* This is a Corps of Engineers item in FSC 8030. It is listed in SM 5-1-8000.

*c. Uses.*

(1) It is used for wood-sash glazing.

(2) It is used to fill countersunk holes or dented imperfections in wood.

**Caution:** Putty should never be applied at temperatures below 40° F.

## 233. Silicone Compound Water Repellent

*a. Characteristics.* This is a material composed of silicone oils used on glass surfaces to overcome objectionable interference caused by adhering water.

*b. Supply Data.* This is an Ordnance Corps item in FSC 6850. It is listed in SM 9-1-6800.

*c. Use.* It is used on windshields, periscope windows, indicator windows, mirrors, and similar exposed surfaces. It improves vision and overcomes interference caused by water adhering to glass surfaces from rain or amphibious operations. It causes the water to form in droplets and roll off the treated surface.

**Warning:** Avoid contact with skin or eyes. Flush area immediately with water. If eyes are affected, get medical attention.

**Caution:** Do not use this compound on metal, plastic, or coated optics.

## 234. Stopper, Bottle: Cork (LLL-S-731, Type I, Grade A, Class 2)

*a. Characteristics.* This is a tapered stopper made of natural corkwood. All stoppers are of the uncemented type.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 8125. It is listed in SM 10-1-8100.

*c. Uses.*

(1) It is used for plugging the bores of small arms during phosphatizing.

(a) No. 00 ----- Cal. 22 muzzle and breech

(b)  $\frac{3}{8}$  x  $\frac{7}{8}$  straight-- Cal. 30 muzzle

(c) No. 4 ----- Cal. 30 breech (rifle and machine gun)

(d)  $\frac{3}{8}$  x  $\frac{7}{8}$  straight-- Cal. 30 breech (carbine)

(e) No. 4 ----- Cal. 45 muzzle and breech

(f) No. 4 ----- Cal. 50 muzzle

(g) No. 9 ----- Cal. 50 breech

(2) No. 2 and 11 are used in optical shops. Refer to TM 9-1501.

**235. Tape, Pressure Sensitive Adhesive:  
Cellulose-Backing, Transparent,  
Clear, Water-Resistant (UU-T-101,  
Type II)**

*a. Characteristics.* This is a transparent cellulose tape, coated on one side with a pressure-sensitive adhesive that will adhere firmly to steel, paper, and other surfaces.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7510. It is listed in SM 10-1-7500.

*c. Use.* It is used for repairing manuscripts, drawings, books, etc., where a transparent tape is required.

**236. Tape, Pressure Sensitive Adhesive:  
Cloth-Backing, Opaque, Oil-and  
Water-Resistant (PPP-T-60, Type III,  
Class 1)**

*a. Characteristics.* This tape consists of a waterproof-cloth backing and a pressure-sensitive adhesive which does not require heat or moisture prior to applying it. The tape will not corrode polished metal and will not damage painted, varnished, or other finished surfaces.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 8135. It is listed in SM 10-1-8100.

*c. Uses.*

- (1) It is designed primarily for applications requiring high strength and maximum resistance to oil and to weathering, such as rain and sunlight.
- (2) It is used for sealing equipment, such as guns, tanks, and vehicles that are shipped unboxed.

**237. Tape, Pressure Sensitive Adhesive:  
Crepe-Paper-Backing, Opaque,  
Water- and Paint-Resistant  
(UU-T-106, Type I)**

*a. Characteristics.* The crepe paper backing of this tape is water-resistant and is impervious to paints, varnishes, and other finishing materials and the adhesive is in no way harmful to finishes or surfaces with which it comes in contact. The adhesive is pressure-sensitive and requires no heat, moisture, or any other manner of preparation prior to its application.

*b. Supply Data.* This is a Quartermaster Corps item in FSC 7510. It is listed in SM 10-1-7500.

*c. Use.* It is used for masking or shielding purposes, so that paint or coating being applied can be excluded from openings and certain areas.

**238. White Lead, Basic Carbonate  
(TT-W-251)**

*a. Characteristics.* This is a compound containing white lead pigment, linseed oil, and a small quantity of volatile matter. It is a soft paste of pouring consistency.

*b. Supply Data.* This is a Corps of Engineers item in FSC 8010. It is listed in SM 5-1-8000.

*c. Uses.*

- (1) It is used as a preservative coating for exposed metallic surfaces.
- (2) It is used as a sealing and antiseize compound for threaded fittings, such as pipe threads.

## APPENDIX

### REFERENCES

---

#### 1. Publication Indexes

The following indexes should be consulted frequently for latest changes or revisions of references given herein and for new publications relating to the materials covered in this manual.

##### Military Publications:

Index of Administrative Publications .....	DA PAM 310-1
Index of Blank Forms .....	DA PAM 310-2
Index of Supply Manuals—Chemical Corps .....	DA PAM 310-23
Index of Supply Manuals—Corps of Engineers .....	DA PAM 310-25
Index of Supply Manuals—Ordnance Corps .....	DA PAM 310-29
Index of Supply Manuals—Quartermaster Corps .....	DA PAM 310-30
Index of Technical Manuals, Technical Bulletins, Supply Manuals, Lubrication Orders, and Modification Work Orders.	DA PAM 310-4

#### 2. Supply Manuals

The following Department of the Army Supply Manuals pertain to the materials in this manual.

##### *a. General.*

Introduction .....	ORD 1
--------------------	-------

##### *b. Maintenance and Repair.*

Brushes, Paints, Sealers and Adhesives .....	SM 9-1-8000
Chemicals and Chemical Products .....	SM 3-1-6800, SM 3-5-6800, SM 9-1-6800, SM 10-1-6800, Part III, Supply Management Data SM 3-3-3-2
Cleaning Equipment and Supplies .....	SM 10-1-7900, 8000
Construction and Building Materials .....	SM 9-1-5600
Containers, Packaging and Packing Supplies .....	SM 10-1-8100, SM 10-5-8100
Hardware and Abrasives, Abrasive Materials .....	SM 9-1-5350
Hardware and Abrasives, Disks and Stones, Abrasive .....	SM 9-1-5345
Hardware and Abrasives, Packing and Gasket Material .....	SM 9-1-5330

Household and Commercial Furnishings and Appliances -----	SM 10-1-7200
Instruments and Laboratory Equipment -----	SM 10-1-6600
Medical, Dental and Veterinary Equipment and Supplies -----	SM 10-1-6500
Nonmetallic Fabricated Materials; Nonmetallic Crude Materials -----	SM 10-1-9300, 9400
Office Supplies -----	SM 10-1-7500
Photographic Equipment; Chemicals and Chemical Products; Training Aids and Devices; Household and Commercial Furnishings and Appliances; Books, Maps and Other Publications; Cleaning Equipment and Supplies; Brushes, Paints, Sealers, and Adhesives; Containers, Packaging, and packing Supplies; Agricultural Supplies; Fuels, Lubricants, Oils, and Waxes; Nonmetallic Fabricated Materials; Metal Bars, Sheets, and Shapes; Ores, Minerals, and Their Primary Products; Miscellaneous.	SM 5-1-6700, 6800, 6900, 7200, 7500, 7600, 7900, 8000, 8100, 8700, 9100, 9300, 9500, 9600, 9900
Textile, Leather and Furs, Textile Fabrics -----	SM 10-1-C2-2A
Textile, Leather and Furs; Yarn and Thread; Notions and Apparel Findings; Padding and Stuffing Materials.	SM 10-1-C2-3A, 15, 20

### 3. Forms

Unsatisfactory Equipment Report -----	DA Form 468
---------------------------------------	-------------

### 4. Other Publications

Authorized Abbreviations and Brevity Codes -----	AR 320-50
Chassis Coating Compound (Underbody Coating Compound); Description of Application, and Equipment Used.	TB ORD 401
Cleaning of Ordnance Materiel -----	TM 9-208-1
Cooling Systems: Vehicles and Powered Ground Equipment -----	TM 9-2858
Equipment, Grinding, Boring Valve Reseating Machines and Lathes ---	TM 9-1834A TM 9-200
Military Terms, Abbreviations and Symbols Dictionary of United States Army Terms.	AR 320-5
Ordnance Maintenance: Operation and Maintenance of Optical Coating Machines.	TM 9-1501
Packaging of Small Arms Material With Volatile Corrosion Inhibitor (VCI).	TB ORD 623 9-208-1
Methods of Cleaning Materials -----	9-208-1
Preservation, Packaging and Packing of Military Supplies and Equipment.	TM 38-230
Processing of Motor Vehicles and Related Unboxed Materiel for Shipment and Storage.	SB 9-4
Safety Accidents Reports and Records -----	AR 385-40
Strippable Plastic Coating Compound; Description, Equipment Used, Method of Application, Inspection and Maintenance.	TB ORD 574

# INDEX

	Paragraphs	Pages		Paragraphs	Pages
<b>Abrasive:</b>			<b>Accidents field reports</b> -----	2c	2
Abrasive cloth assortment, aluminum oxide (P-C-451) -----	116	29	<b>Acetic acid (O-A-76)</b> -----	6	3
Abrasive paper assortment, flint (P-P-105) -----	117	29	<b>Acetone, technical (O-A-51)</b> -----	7	3
Band, abrasive, aluminum oxide (P-B-172) -----	140	34	<b>Acid:</b>		
Belt, abrasive:			Acetic (O-A-76) -----	6	3
Aluminum oxide (P-B-172) -----	141	34	Boric -----	12	5
Garnet (P-B-172) -----	142	34	Chromium trioxide -----	17	5
Silicon carbide (P-B-172) -----	143	34	Hydrochloric (O-A-86) -----	36	10
Buffing compound, tripoli -----	118	30	Hydrofluoric (O-H-795) -----	37	10
<b>Cloth abrasive:</b>			Muriatic -----	36	10
Aluminum oxide (P-C-451) -----	119	30	Nitric -----	43, 44	11, 12
Crocus (P-C-458) -----	120	30	Orthophosphoric (O-P-313) -----	45	12
Silicon carbide (P-C-451) -----	121	30	Oxalic, dihydrate -----	193	44
<b>Disk, abrasive:</b>			Sulfuric (O-A-115) -----	68	17
Adhesive -----	150	36	<b>Adhesives:</b>		
Aluminum oxide (MIL-D-15770) -----	144	34	Abrasive disk -----	150	36
Garnet -----	145	35	Canvas (MIL-C-2399) -----	151	36
Silicon carbide -----	146	35	Floor covering -----	152	36
<b>Grain, abrasive:</b>			Fording kit -----	153	36
Aluminum oxide -----	122	30	Glass cloth -----	154	37
Aluminum oxide 3 micron size -----	123	31	Liquid rubber -----	155	37
Garnet, spark plug (MIL-C-774) -----	124	31	MIL-A-5092 -----	157, 158, 159	37, 38
Silicon carbide (synthetic) -----	125	31	MIL-A-13883 -----	160	38
Tripoli -----	126	31	MIL-C-2749 -----	161	38
<b>Lapping and grinding compound:</b>			MIL-C-4003 -----	156	37
Aluminum oxide, grease mixed -----	127	31	Neoprene -----	162	38
Grease or water mixed -----	128	31	<b>Paper:</b>		
Silicon carbide, water mixed -----	129	32	ZZ-C-191 (Artist and photographers) -----	163	38
<b>Paper, abrasive:</b>			MMM-M-792 -----	164	39
Emery -----	130	32	Rubber (MIL-C-897) -----	165	39
Flint (P-P-105) -----	131	32	<b>Tires and tubes:</b>		
Garnet (P-P-121) -----	132	32	Cold patching (ZZ-C-191, type II) -----	166	39
Silicon carbide (P-P-101) -----	133	32	Cold process (ZZ-T-416, type IV, class B) -----	168	39
<b>Polishing abrasive, optical glass (MIL-P-3237) -----</b>	134	33	Heat-vulcanizable (ZZ-T-416, type IV, class A) -----	167	39
<b>Pumice, technical, ground (SS-P-821) -----</b>	135	33	Watch crystal -----	169	39
<b>Rouge, abrasive, polishing:</b>			<b>Alcohol, denatured (O-A-396) -----</b>	8	4
General use, molded -----	136	33	<b>Aluminum oxide:</b>		
Jewelers -----	137	33	Abrasive:		
<b>Sand, lithographic graining, aluminum oxide -----</b>	138	33	Band -----	140	34
<b>Steel wool (FF-W-556) -----</b>	139	33	Belt (P-B-172) -----	141	34
			Cloth (P-C-451) -----	119	30
			Cloth assortment (P-C-451) -----	116	29
			Disk -----	144	34
			Grain -----	122	30
			Lapping and grinding compound -----	126	31
			Lithographic graining sand -----	138	33

	Paragraphs	Pages		Paragraphs	Pages
Ammonium:			Hydrochloric acid, technical		
Chloride, technical (O-A-491) ..	187	43	(O-A-86) .....	36	10
Hydroxide, technical (O-A-451) ..	9	4	Hydrofluoric acid, technical		
Sulfate, technical .....	85	21	(O-H-795) .....	37	10
Antiseize compound:			Magnesium fluoride, technical		
Leadpowder and oil .....	212	46	(JAN-M-621) .....	38	11
JAN-A-669 .....	214	47	Mercuric iodide, red, analyzed		
MIL-A-13881 .....	213	46	reagent .....	191	43
Antistatic and cleaner compound			Methanol, technical (O-M-232)	39	11
(MIL-C-12156) .....	9	4	Methyl ethyl ketone, technical		
Automotive sealing compound (MIL-			(TT-M-261) .....	40	11
S-3802) .....	172	40	Methyl orange xylene cyanole		
Band, abrasive, aluminum oxide			solution .....	192	44
(P-B-172) .....	140	34	Naptha, aliphatic (TT-N-95) ..	41	11
Benzene, technical .....	11	4	Napthalene, technical (R-N-91)	98	23
Bore cleaner, solvent cleaning com-			Nitric acid:		
pound .....	24	7	ACS .....	43	11
Boric acid, ACS .....	12	5	Technical .....	44	12
Brake lining filler compound .....	221	47	Orthophosphoric acid, technical		
Bromocresol green, reagent .....	188	43	(O-P-313) .....	45	12
Buffing compound, tripoli .....	118	30	Oxalic acid, dihydrate, technical		
Calcium carbonate, precipitated,			(O-A-91) .....	193	44
USP .....	13	5	Phenolphthalein solution .....	194	44
Calking compound (TT-C-598) ....	215	47	Potassium:		
Canada balsam (MIL-B-3469) ....	216	47	Bifluoride, technical .....	195	44
Canvas adhesive (MIL-C-2399) ....	151	36	Bipthalate .....	196	44
Carbon removing compound (P-C-			Cyanide, technical .....	101	24
111) .....	14	5	Dichromate .....	102, 197	24, 44
Carbon tetrachloride, technical (O-			Ferricyanide, reagent .....	198	44
C-141) .....	15	5	Ferrocyanide, trihydrate,		
Cement, watch jewel .....	217	47	reagent .....	199	44
Chamois leather, sheepskin (KK-C-			Iodide, ACS .....	200	45
300) .....	16	5	Nitrate, technical .....	103	24
Chemicals:			Permanganate, solution .....	201	45
Acetic acid, glacial, technical			Sodium tartrate, tetrahy-		
(O-A-76) .....	6	3	drate, technical (Rochelle		
Acetone, technical (O-A-51) ..	7	3	Salts) .....	50	13
Alcohol denatured (O-A-396) ..	8	4	Silver nitrate, ACS .....	202	45
Ammonium:			Sodium:		
Chloride, technical (O-A-			Bicarbonate, technical (O-		
491) .....	187	43	S-576) .....	203	45
Hydroxide, technical (O-A-			Borate decahydrate, tech-		
451) .....	9	4	nical .....	204	45
Sulfate, technical .....	85	21	Carbonate anhydrous .....	61, 205	16, 45
Benzene, technical (VV-B-231)	11	4	Cyanide, technical .....	59	15
Boric acid, ACS .....	12	5	Dichromate, dihydrate, tech-		
Bromocresol green, reagent ....	188	43	nical (O-S-595) .....	106	24
Calcium carbonate, precipitated,			Hydroxide .....	60, 206, 207	15, 45, 46
USP .....	13	5	Metasilicate anhydrous,		
Carbon tetrachloride, technical			technical .....	62	16
(O-C-141) .....	15	5	Nitrate, technical (O-S-		
Chromium trioxide, technical			634) .....	63	16
(O-C-303) .....	17	5	Oxalate ACS .....	107	25
Diethylene glycol, technical ....	189	43	Phosphate tribasic, anhy-		
Ethyl alcohol, technical (JAN-			drous technical .....	64	16
A-463) .....	35	10	Pyrophosphate anhydrous,		
Ethylene glycol, technical			technical .....	65	17
(CML-PD-4-439) .....	93	22	Silicate solution (O-S- 605)	208	46
			Thiosulfate solution, re-		
			agent .....	209	46

	Paragraphs	Pages		Paragraphs	Pages
Starch, soluble, reagent -----	210	46	Wipe off type (MIL-M-10578) -----	32	9
Sulfuric acid, technical (O-A-115) -----	68	17	Detergent, painted surface (P-C-431) -----	33	9
Tetrachloroethylene, technical (O-P-191) -----	72	18	Dry cleaning solvent (P-S-661) -----	34	10
Toluene, technical -----	74	18	Ethyl alcohol, technical (JAN-A-463) -----	35	10
Trichloroethane, technical (O-T-620) -----	75	19	Hydrochloric acid, technical (O-A-86) -----	36	10
Trichloroethylene, technical (O-T-634) -----	76	19	Hydrofluoric acid, technical (O-H-795) -----	37	10
Xylene, technical -----	81	20	Magnesium fluoride, technical (JAN-C-621) -----	38	11
Zinc carbonate, analyzed, reagent -----	211	46	Methanol, technical (O-M-232) -----	39	11
Chromium trioxide, technical -----	17	5	Methyl ethyl ketone, technical (TT-M-261) -----	40	11
Cleaning compound:			Naptha, aliphatic (TT-N-95) --	41	11
Alkali (P-C-436) -----	18	6	Napkin, table, textile -----	42	11
Electrical and electronic -----	19	6	Nitric acid:		
Engine cooling system (MIL-C-10597) -----	20	7	ACS -----	43	11
High pressure cleaner (P-S-751) -----	21	7	Technical -----	44	12
Lapping disk -----	22	7	Orthophosphoric acid, technical (O-P-313) -----	45	12
Optical lens -----	23	7	Paper, lens (UU-P-313) -----	46	13
Cleaning compound solvent:			Paper, watchmaker's -----	47	13
Cleaner bore (RA (ID) PD126) --	24	7	Polish, automobile (P-P-546) --	48	13
Degreasing, self-emulsifying (MIL-S-11090) -----	25	8 ✓	Polish, metal (P-P-556) -----	49	13
Cleaning materials:			Potassium sodium tartrate, tetrahydrate, technical (Rochelle Salts) -----	50	13
Acetic acid, glacial, technical (O-A-76) -----	6	3	Rag, wiping (DDD-W-415) --	51	13
Acetone, technical (O-A-51) --	7	3	Remover, paint:		
Alcohol, denatured (O-A-396) --	8	4	Alkali-organic solvent type (MIL-R-12294) -----	52	13
Ammonium hydroxide, technical (O-A-451) -----	9	4	Alkali-type (TT-R-230) --	53	14
Antistatic and cleaner compound (MIL-C-12156) -----	10	4	Organic solvent, nonflammable (TT-R-251) -----	54	14
Benzene, technical -----	11	4	Rinsing solution watch (MIL-C-16553) -----	55	14
Boric acid, ACS -----	12	5	Rubbing compound, lacquer (TT-R-771) -----	56	14
Calcium carbonate, precipitated, USP -----	13	5	Soap, automobile and floor (P-S-598) -----	57	15
Carbon removing compound (P-C-111) -----	14	5	Soap, saddle (P-S-609) -----	58	15
Carbon tetrachloride, technical (O-C-141) -----	15	5	Sodium:		
Chamois leather, sheepskin (KK-C-300) -----	16	5	Carbonate, anhydrous, technical (O-S-571) -----	61	16
Chromium trioxide, technical --	17	5	Cyanide, technical (O-S-591) -----	59	15
Cloth, cotton, batiste -----	26	8	Hydroxide, technical (P-S-631) -----	60	15
Cloth, jute, burlap (CCC-B-811) -----	27	8	Metasilicate, anhydrous, technical -----	62	16
Corrosion removing compound:			Nitrate, technical (O-S-634) -----	63	16
Alkaline, immersion -----	28	8	Phosphate, tribasic, anhydrous, technical (O-T-00671) -----	64	16
Hydrochloric acid w/inhibitor -----	29	8	Pyrophosphate, anhydrous, technical -----	65	17
Metal conditioner and rust remover:					
Phosphoric acid type (ORDJR-OME-PD-109) -----	30	8			
Wash off type (MIL-M-10578) -----	31	9			



	Paragraphs	Pages		Paragraphs	Pages
Sponge:			Ethyl alcohol, technical (JAN-A-463)	35	10
Natural (C-S-631) -----	66	17	Ethylene glycol, technical (CML-PD-4-439) -----	93	22
Vinyl (MIL-S-11036) -----	67	17	Filler compound, brake lining -----	221	47
Sulfuric acid, technical			Filler, wood, plastic (TT-F-340) --	222	47
(O-A-115) -----	68	17	Fire control instrument sealing compound:		
Swab, small arms cleaning -----	69	18	FXS 780 -----	176	41
Sweeping compound (MIL-C-15043) -----	70	18	MIL-S-11030 type I -----	177	41
Tape, textile, cotton -----	71	18	MIL-S-11030 type II -----	174	40
Tetrachloroethylene, technical			MIL-S-11031 -----	175	40
(O-P-191) -----	72	18	Flanged joint sealing compound ---	178	41
Thinner, paint mineral spirits			Flint abrasive paper assortment		
(TT-T-291) -----	73	18	(P-P-105) -----	117	29
Toluene, technical -----	74	18	Flint abrasive paper (P-P-105) ---	131	32
Trichloroethane, technical			Floor covering adhesive -----	152	36
(O-T-620) -----	75	19	Fording kit adhesive -----	153	36
Trichloroethylene, technical			Fording kit sealing compound -----	179	41
(O-T-634) -----	76	19	Garnet:		
Turpentine, gum spirits (TT-T-801) -----	77	19	Abrasive:		
Type cleaner -----	78	19	Belt (P-B-172) -----	142	34
Waste, matted yarns:			Disk -----	145	35
Cotton, colored -----	79	19	Paper (P-P-121) -----	132	32
Cotton, white -----	80	19	Spark plug abrasive grain		
Xylene, technical -----	81	20	(MIL-C-774) -----	124	31
Cloth:			Gasket cement (MIL-C-10523) -----	223	48
Abrasive:			Gasket forming compound -----	224	48
Aluminum oxide (P-C-451) -----	119	30	Glass cloth adhesive -----	154	37
Assortment -----	116	29	Grain, abrasive:		
Crocus (P-C-458) -----	120	30	Aluminum oxide -----	122	30
Silicon carbide (P-C-451) -----	121	30	Aluminum oxide (synthetic) -----	123	31
Cotton:			Garnet, spark plug (MIL-C-774) -----	124	31
Batiste -----	26	8	Silicon carbide (synthetic) -----	125	31
Tape, textile -----	71	18	Tripoli -----	126	31
Jute, burlap (CCC-B-811) -----	27	8	Graphite, dry (MIL-G-6711) -----	225	48
Coating rust arresting (MIL-R-10036) -----	105	24	Hydraulic systems preservative oil		
Compound paste, grinder -----	218	47	(MIL-P-12098) -----	104	24
Compound waterproof -----	219	47	Hydrochloric acid, technical (O-A-86) -----	36	10
Corrosion removing compound:			Hydrofluoric acid, technical (O-H-795) -----	37	10
Alkaline, immersion -----	28	8	Insulating compound, electrical:		
Hydrochloric acid w/inhibitor			Liquid -----	226	48
(MIL-A-13528) -----	29	8	Paste (MIL-I-8660) -----	227	48
Metal conditioner and rust			Insulating sealing compound -----	180	41
remover:			Lapping and grinding compound:		
Phosphoric acid-type			Aluminum oxide, grease mixed --	127	31
(ORDJR-OME-PD-109) -----	30	8	Grease or water mixed -----	128	31
Wash off type (MIL-M-10578) -----	31	9	Silicon carbide, water mixed --	129	32
Wipe off type (MIL-M-10578) -----	32	9	Leather:		
Crayon, marking (SS-C-661) -----	220	47	Chamois, sheepskin (KK-C-300) -----	16	5
Crocus abrasive cloth (P-C-458) --	120	30	Belt dressing (O-L-169) -----	88	22
Detergent, painted surface (P-C-431) -----	33	9	Dressing, mildew-preventive		
Diethylene glycol, technical -----	189	43	(O-L-164) -----	95	23
Electric wires and cables sealing			Litmus paper -----	228	48
compound -----	173	40			
Emery abrasive paper -----	130	32			

	Paragraphs	Pages		Paragraphs	Pages
Magnesium fluoride, technical (JAN-C-621) -----	38	11	Belt dressing, leather (O-L- 169) -----	88	22
Masking paste (TT-P-181) -----	229	49	Coating compound: Bituminous solvent type (TT-C-520) -----	89	22
Mercuric iodide, red, analyzed re- agent -----	191	43	Oxide black (MIL-F- 13924) -----	90	22
Metal, phosphate coating (MIL-C- 50002) -----	100	24	Oxide black, nonbearing surface -----	91	22
Methanol, technical (O-M-232) ---	39	11	Corrosion preventive, fingerprint remover (MIL-C-15074) -----	92	22
Methyl ethyl ketone (TT-M-261) --	40	11	Ethylene glycol, technical (CML-PD-4-439) -----	93	22
Methyl orange xylene cyanole solu- tion -----	192	44	Gum preventive compound, gaso- line (MIL-G-14418) -----	94	23
Mineral spirits paint thinner (TT- T-291) -----	73	18	Leather dressing, mildew-pre- ventive (O-L-164) -----	95	23
Napkin, table, textile -----	42	11	Linseed oil, raw (TT-O-369) --	96	23
Naptha, aliphatic (TT-N-95) -----	41	11	Mildew resistant compound tex- tile (MIL-C-13295) -----	97	23
Nitric acid -----	43, 44	11, 12	Naphthalene, technical (R-N- 91) -----	98	23
Optical coating machine sealing compound -----	181	41	Neet's foot oil (C-N-200) -----	99	23
Orthophosphoric acid (O-P-313) --	45	12	Phosphate coating, metal (MIL- C-50002) -----	100	24
Oxalic acid, dihydrate, technical ---	193	44	Potassium: Cyanide, technical -----	101	24
Paper:			Dichromate, technical -----	102	24
Abrasive:			Nitrate, technical -----	103	24
Assortment -----	117	29	Preservative, oil, hydraulic sys- tems (MIL-P-12098) -----	104	24
Emery -----	130	32	Rust arresting coating (MIL- R-10036) -----	105	24
Flint (P-P-105) -----	131	32	Sodium: Dichromate, dihydrate, technical (O-S-595) -----	106	24
Garnet (P-P-121) -----	132	32	Oxalite, ACS -----	107	25
Silicon carbide (P-P-101) --	133	32	Surfacer, liquid (MIL-S-974) --	108	25
Adhesive:			Talc, technical (ZZ-T-416) ---	109	25
ZZ-C-191, type I -----	163	38	Wadding, creped cellulose -----	110	25
MMM-M-792 -----	164	39	Water repellent compound, tex- tile finish (MIL-C-1068) ---	111	25
Lens -----	46	13	Wood preservative, pentachloro- phenol mixture (MIL-S- 13518) -----	112	25
Watchmaker's -----	47	13	Pumice, technical, ground (SS-P- 821) -----	135	33
Phenolphthalein solution -----	194	39	Putty (TT-P-791) -----	232	49
Pigment, iron blue (TT-P-381) ---	230	49	Rag wiping (DDD-W-415) -----	51	13
Plaster gypsum (MIL-G-0020098) --	231	49	Remote control system sealing com- pound -----	182	41
Polish:			Remover, paint: Alkali-organic solvent type (MIL-R-12294) -----	52	13
Automobile (P-P-546) -----	48	13	Alkali-type (TT-R-230) -----	53	14
Metal (P-P-556) -----	49	13	Organic solvent nonflammable (TT-R-251) -----	54	14
Polishing abrasive, optical glass (MIL-P-3237) -----	134	33	Reports: Field reports of accidents -----	2c	2
Potassium:			Unsatisfactory equipment and materials -----	2d	2
Bifluoride, technical -----	195	44			
Bipthalate -----	196	44			
Cyanide, technical -----	101	24			
Dichromate -----	102	24			
Ferrycyanide, reagent -----	198	44			
Ferrocyanide trihydrate, re- agent -----	199	44			
Iodide, ACS -----	200	45			
Nitrate, technical -----	103	24			
Permanganate solution -----	201	45			
Tartrate tetrahydrate, technical	50	13			
Preservative materials:					
Ammonium sulfate, technical ---	85	21			
Antifreeze, arctic (MIL-C- 11755) -----	86	21			
Antifreeze, ethylene glycol (O-A-548) -----	87	21			

	Paragraphs	Pages		Paragraphs	Pages
Rinsing solution watch (MIL-C-16553) .....	55	14	Solutions:		
Rouge abrasive, polishing:			Methyl orange xylene cyanole ..	192	44
General use, (molded) .....	136	33	Phenolphthalein .....	194	44
Jewelers .....	137	33	Potassium permanganate .....	201	45
Rubbing compound, lacquer (TT-R-771) .....	56	14	Sodium silicate .....	208	46
Sand, Lithographic graining, aluminum oxide .....	138	33	Watch rinsing .....	55	14
Silicon carbide:			Sponge:		
Abrasive:			Natural (C-S-631) .....	66	17
Belt (P-B-172) .....	143	34	Vinyl (MIL-S-11036) .....	67	17
Cloth (P-C-451) .....	121	30	Starch, soluble, reagent .....	210	46
Disk .....	146	35	Steel Wool (FF-W-556) .....	139	33
Grain .....	125	31	Stopper, bottle (LLL-S-731) .....	234	33
Lapping and grinding compound .....	129	32	Storage battery sealing compound ..	183	42
Paper (P-P-101) .....	133	32	Sulfuric acid, technical (O-A-115) ..	68	17
Silicone compound water repellent ..	233	49	Swab, small arms cleaning .....	69	18
Silver nitrate, ACS .....	202	45	Sweeping compound (MIL-C-15043) ..	70	18
Small arms cleaning swab .....	69	18	Tape, pressure, sensitive adhesive:		
Soap:			Cellulose-backing (UU-T-101) ..	235	50
Automobile and floor (P-S-598) ..	57	15	Cloth-backing (PPP-T-60) ..	236	50
Saddle (P-S-609) .....	58	15	Creped-paper-backing (UU-T-106) ..	237	50
Sodium:			Tape, textile, cotton .....	71	18
Bicarbonate, technical (O-S-576) ..	203	45	Tetrachloroethylene, technical (O-P-191) ..	72	18
Borate, decahydrate, technical ..	204	45	Textile mildew-resistant compound (MIL-C-13295) ..	97	23
Carbonate, anhydrous:			Thinner, paint, mineral spirits (TT-T-291) ..	73	18
Reagent .....	205	45	Tire and tube adhesive .....	166-168	39
Technical (O-S-571) .....	61	16	Toluene, technical .....	74	18
Cyanide, technical .....	59	15	Trichloroethane, technical (O-T-620) ..	75	19
Dichromate dihydrate, technical (O-S-595) ..	106	24	Trichloroethylene, technical (O-T-634) ..	76	19
Hydroxide:			Tripoli, abrasive grain .....	126	31
ACS .....	206	45	Turpentine, gum spirits (TT-T-801) ..	77	19
Solution .....	207	46	Type cleaner .....	78	19
Technical .....	60	15	Vinyl sponge .....	67	17
Metasilicate anhydrous technical ..	62	16	Waste, matted, yarns:		
Nitrate, technical .....	63	16	Cotton colored .....	79	19
Oxalite, ACS .....	107	25	Cotton white .....	80	19
Phosphate tribasic, anhydrous technical (O-T-00671) ..	64	16	White lead, basic carbonate (TT-W-251) ..	238	50
Pyrophosphate anhydrous technical ..	65	17	Xylene, technical .....	81	20
Silicate solution (O-S-605) ..	208	46	Zinc carbonate, analyzed reagent ..	211	46
Thiosulfate solution, reagent ..	209	46			

By Order of *Wilber M. Brucker*, Secretary of the Army:

**G. H. DECKER,**  
*General, United States Army,*  
*Chief of Staff.*

Official:

**R. V. LEE,**  
*Major General, United States Army,*  
*The Adjutant General.*

Distribution:

*Active Army:*

To be distributed in accordance with DA Form 12-7 requirements for TM 9 series (UNCL) plus the following Formula:

DCSLOG (1)	Corps (2)
Tech Stf, DA (1) except	Div (2)
CofOrd (9)	Ord Gp (2)
US ARADCOM (2)	Ord Bn (2)
US ARADCOM Rgn (2)	Ord Co (2) except
Seventh US Army (3)	TOE 9-17, 9-347 (None)
EUSA (3)	Raritan Arsenal (53)

NG: State AG (3); Units Same as Active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

☆ U. S. Government Printing Office: 1960-570505